THE IRON TRADE REVIEW

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THE IRON TRADE REVIEW.

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CLEVELAND, O., AUGUST 28, 1890.

THE WEEK IN IRON CIRCLES.

General Features. "Hopefulness" is the word that most nearly describes the feeling in Central Western iron markets. The heavy cotton crop of the South, it is thought, will make business more active after the first of the year, and the fact that in the West a large amount of grain has been held over from last year, which can now be sold at a handsome price, will, it is considered, improve the situation there. Enormous quantities of structural iron and steel will soon be in demand for extensive building enterprises in Chicago and other cities, and lake shipyards will take all the ship plate that can be had. The coke trade grows better as September approaches, and enthusiasts predict that the Fall trade "will beat the best boom record yet made." Money is still dear in the East, and this has had the effect of clogging business somewhat in the West, one Cleveland bank, it is stated, having recently borrowed from the New York banks to the extent of $700,000 to supply simply the needs of its regular customers. The stringency, however, is generally recognized as only temporary, and the situation will no doubt be relieved within a few days. At Detroit there is unquestionably a firmer and better feeling for every grade on the pig iron list. Transactions have increased in number, but none of large amounts have been reported. Generally the buyers of the past week have wanted from 50 to 300 tons, for reasonably prompt delivery. This particularly refers to Southern iron. However, Lake Superior charcoal remains normal respecting price, although one or two deals of a few hundred tons each were closed in the Detroit market since our last report. Shipping on this grade is being pushed forward rapidly, to fill the large orders placed during June. In manufactured iron the demand has been large for nearly every class of material. Some round orders for bar iron, axles, and tank steel have been placed. The chief difficulty seems to be with the mills being unable to furnish within the necessary time. Every class of iron and steel industry would seem to be pushed to its greatest extent. Better prices are looked for, both by sellers and buyers. The market for pig iron at Cincinnati, during the past week, has been quiet, but a more confident and firmer feeling has prevailed, although there has been no advance in prices. The orders have embraced the entire range, from No. 1 foundry to white irons of coke variety, and No. 1 to No. 5 charcoal. The Southern furnaces are less inclined to grant either concessions in price or delivery, basing their views upon the large decrease of iron stocks in the South during the past month. Northern stacks, too, although less fortified by statistics, preserve a firm feeling, because of heavy melting and liberal orders. Toward the close of the week some transactions of moment were effected. The market at Louisville has not been active during the the past week, and sales have been for small amounts. It is fortunate, owing to some of the large companies having made their purchases for the Fall during the past three weeks, that furnaces are not compelled to push their iron upon the market at the present time, and are carrying small stocks, their output in most instances being sold up for three months or the balance of the year, and they hope by that time to find a much better feeling. While the amount of business placed during the past week at Chicago has not been large, a fair run of small orders has been booked. A prominent feature at present is the demand from consumers for prompt deliveries on existing contracts. Prices continue firm on both Northern and Southern brands. The past week developed a moderate number of inquiries, at St. Louis, whilst a few medium sized orders have been placed at irregular figures. Consumption continues active, and, with few exceptions, Southern furnaces present a strong front. There is a quiet but steady trade in Ohio softeners at unchanged figures. In charcoal irons there is scarcely any movement, prices remaining firm. At present there is a little more hopeful feeling noticed in pig iron circles in Buffalo than during the past one or two weeks. Sales, though light, are more frequent, and inquiries are more numerous. As future prices depend so much on consumption, and this in turn on several questions at the present time unknown, it is impossible to predict the market with any degree of certainty.

Iron Ore. What has been presaged all along by the ore men in a position to know, is beginning to be verified, and the ratio of increase over last year, in the lake shipments, is showing a marked falling off. The total increase, thus far, over last year's figures, is still very large, however, and there is little reason to doubt that the season's shipments will foot up just about at the notch indicated heretofore in these columns. The scarcity of labor, in some of the mining districts, is cited as one of the reasons for the falling off, while in other quarters—the stock piles being exhausted—the daily production was found to be inadequate to the expectations of some too sanguine mine owners. The product of the year is practically sold. In non-Bessemers, to be sure, there are still on hand, as there always are, some remnants, odds and ends, some of them marketable, but in the aggregate of no consequence; and what little Bessemer there remains, is in firm hands, and is being held for an advance. The consumers of iron ore, who are now complaining of the high price they have had to pay as compared with former years, ought to realize that they, themselves, made the price. It may be set down as a certainty that not an ore dealer in the business expected to realize an advance, at the close of last season, of 75 cents or $1 a ton, until the furnace-men began to insist upon having prices quoted, and the result has simply been a driving up of the price, by reason of the extraordinary demand. At the beginning of this season the prospects were good for the production of considerable low-grade ore which, under existing conditions, will not be brought down.

Pig Iron. The market is still unsettled, and in some spots shows an unexpected weakness. Bessemer, which has been very firm all along, is reported to have sold in Pittsburgh at $18, meaning a drop of half a dollar. This quotation, however, is repudiated in the local market, one leading concern going so far as to announce its intention to blow out its furnaces rather than make Bessemer iron at the figure quoted. The complaint is loud and bitter against the coke men, who insist on a price for their product out of all proportion with the rest of the material that goes into the manufacture of pig iron. Furnace-men declare that they are tired working for the exclusive benefit of the coke producers, and that there will have to be a readjustment of the price. They claim, and not without reason, that $2.15 is an outrageous price to ask for a ton of coke in view of the present and prospective pig iron prices, and that the coke men are fast killing the goose that lays the golden egg. The demand for mill iron is still good, but very few furnaces care to engage their output for any good-sized delivery running beyond October.

Merchant Iron. The demand is very strong for bar iron, and the market in that line is correspondingly firm. The mills are away behind orders, and consumers who are still unsupplied are apt to find themselves seriously embarrassed unless, by way of paying the penalty for their lack of confidence at a time when their orders would have been quickly filled, they are prepared to pay the higher price.

THE PAST DECADE IN THE PIG-IRON BUSINESS.

With commendable promptness, the Census Office has issued, in less than sixty days from the beginning of the work, a bulletin showing the production of pig-iron in the United States for the year ending June 30, 1890. Great credit is due Dr. William M. Sweet, of Philadelphia, for this magnificent achievement in statistical work. The following points condensed from the report will no doubt be read with interest.

The production of pig-iron for the census year of 1890 was the largest in the history of the iron industry in this country, amounting to 9,579,779 tons of 2,000 pounds, as compared with 3,781,021 tons produced during the census year 1880, and 2,052,821 tons during the census year 1870.

From 1870 to 1880 the increase in production amounted to 1,728,200 tons, or nearly 85 per cent., while from 1880 to 1890 the increase was 5,798,758 tons, or over 153 per cent.

The pig-iron industry of New England has been practically stationary during the last twenty years.

Pig-iron is now made in twenty-five States and Territories.

Pennsylvania produces about one-half of all the pig-iron made in the United States.

Ohio retains second place, dropping, however, from 14 per cent. in 1880 to 13 per cent. in 1890.

Alabama advances from tenth place in 1880 to third place in 1890. Her increase over 1880 is 1,328 per cent.

Illinois, which was seventh in rank in 1880, is fourth in 1890.

New York retires from third to fifth place; Virginia advances from seventeenth to sixth, and Tennessee from thirteenth to seventh.

As showing the greater size and capacity of furnaces in 1890 over those of 1880, the fact is demonstrated that, while the production of 1890 was 5,798,758 tons greater than that of 1880, the number of completed furnaces actually decreased from 681 in 1880 to 562 in 1890. In other words, the average yearly capacity in 1880 was 5,552 tons, while the average yearly capacity of furnaces reported in 1890 was 17,046 tons.

The nine Southern States produced only 350,436 tons in the census year 1880. In 1890 they produced 1,780,909 tons, an increase of 408 per cent.

Kentucky alone, of all the Southern States, shows a decrease in production, amounting to 25 per cent.

Six Western States, Illinois, Indiana, Michigan, Missouri, Ohio and Wisconsin, produced in 1890 2,522,351 tons, against 995,335 tons in 1880, an increase of 153 per cent. Indiana, alone of these States, reports a falling off, amounting to 37 per cent.

During the decade, the use of anthracite has fallen off 71 per cent., while the use of mixed anthracite coal and coke has increased 163 per cent., coke and bituminous coal 343 per cent., charcoal 51 per cent. and castings direct from furnace 135 per cent.

Of Ohio's product in 1879, viz.: 1,302,299 tons, the Mahoning Valley produced 527,164 tons, or nearly half.

The production of Bessemer pig-iron in the United States during the census year, 1890, amounted to 4,233,272 tons, of which Pennsylvania made 2,567,813 tons; Illinois, 616,654 tons; Ohio, 516,654 tons, and other States much smaller quantities.

One hundred and forty-nine thousand, nine hundred and fifty-nine tons of spiegeleisen were produced in the census year 1890.

ITALY ADOPTING PROTECTION.

With evidences of decided chagrin, Mr. Henry O'Neill, the British Consul at Leghorn, informs his Government that the markets of Italy are slowly but surely being closed to British manufactures and, correspondingly, the industries of Italy are being stimulated and built up. He says:

Nor is it British capital alone that has found its way through the hostile barriers; for we find English firms in alliance with Italian houses at Naples, Genoa and other cities, for the production of machinery, while German and French firms control the operations of jute mills at Lucca and the glass works at Pisa. If Italy is determined to exclude foreign-made goods, the foreigner, on his part, is equally determined to supply the necessary "sinew," and the trained technical knowledge. None of the industries which are now being sedulously fostered at the expense of the native consumer, could exist a single day if the hostile tariff was withdrawn. Nor does the money made in these industries remain in the country, for the foreign capitalists –who is the person benefitted—withdraws a large portion of the profits, although, of course, he gives an impetus to local employment. To the present hostile tariffs are the Government indebted for a large portion of their revenue. The customs duties levied upon imports in 1889 averaged 19 per cent. of their total value nd upon many articles of daily use the proportion is far greater. This will be seen from the fact that upon every franc's worth of coffee imported 60 cents were paid; for the same value of wheat 25 cents; the value of refined sugar as increased to the extent of 180 per cent. *ad valorem*, or a duty of 90 francs upon a value of 50 francs. Industries have grown up which are ill adapted to the soil, and for which the raw prodncts have to imported, such as cotton, jute and flax, hides, iron—old, scrap and pig—and fuel.

As a British subject and a Free Trader, Mr. O'Neill, of course, has a great deal of sympathy for the Italian consumer. He has studied political economy to so little profit that he sees no advantage in "sedulously fostering" home industries, which, he acknowledges, are being built up under the present protective system. The fact that some of the capital used comes from foreign sources, especially from Great Britain, is especially galling, though it is to be presumed that the Italians can stand it if the foreign capitalists can. Mr. O'Neill does well to observe that, although the profits go largely back to the pockets of the foreign investors—as, indeed, was the case when Italy imported everything—still "an impetus is given to local employment," which is precisely the thing that is claimed for the protective policy. In proof of this, let the question of a return to the old Free Trade policy be submitted to the vote of the workingmen employed in these new industries, and see the result. We venture to say that even the down-trodden consumers can see the difference between paying tribute to foreign manufacturers, and building up home industries.

LABOR COST IN THE MANUFACTURE OF STEEL RAILS.

Highly important figures have just been given out by the American Iron and Steel Association relative to the labor cost in the manufacture of steel rails. The figures were furnished confidentially by two of the largest steel rail producing companies in Pennsylvania and were not originally intended for publication; but in view of the misleading data published by the Acting Commissioner of Labor, they are now made public. The figures of cost are for 1888 and are rather under the cost at the present time; the market price of steel rails is the same now as in the Spring of that year, viz.: $31 to $31.50 per ton. Of course it will be understood that only the labor cost is given—general expenses of management, clerical forces, insurance, interest, commissions on sales, taxes, wear and tear of machinery, etc., are omitted. The tables are as follows:

No. 1.—Labor cost in producing One Ton of steel rails.	To produce One Ton of			
	Pig iron.	Ingots.	Blooms.	Rails.
Cost of labor in fuel required	$3 68	$4.15	$4.34	$4.70
Cost of labor in ore required	4.66	*5 21	5 26	5.42
Cost of labor in limestone required	.32	.39	.40	.41
Cost of labor at works	2 41	5 75	6 52	8.76
Total labor cost†	$10 47	$15.50	$ 6 52	$19.29

* This item includes the spiegeleisen required. † In this table 50 per cent. of the cost of transportation on the material required is estimated as being paid directly to labor.

No. 2.—Material used in producing Bessemer steel rails.	Labor cost per ton on material.	Material required to produce one ton of pig iron.	Labor cost per ton of product.
ORE.—Labor in mining and connected therewith	$1.80	1 80-100 tons.	$3.24
COKE.—Labor in mining coal and coking	1.00	1 35-100 "	1.35
LIMESTONE.—Labor in quarrying	.30	90-100 "	.27
Labor at furnaces			1.46
Labor on maintenance of furnaces			.50
TRANSPORTATION.—Labor cost of freight on ore per ton from mines to works	*1.60	1 80-100 tons.	2.88
Labor cost of freight on coke per ton from mines to works	*.40	1 35-100 "	.54
Labor cost of freight on limestone per ton from quarry to works	*.25	90-100 "	.23
Total cost of labor on materials and at furnaces in producing one ton of pig iron			$10.47
INGOTS.—For one ton of ingots 1 13-100 tons of pig iron are required at $10.47			$11.83
Labor in converting one ton of ingots			1.12
Labor on maintenance of works			.50
Cost of labor in producing one ton of ingots			$13.45
BLOOMS.—For one ton of blooms 1 8-100 tons of ingots are required at $13.45			$14.52
Labor in blooming one ton of blooms			.59
Labor on maintenance of mill			.43
Cost of labor in producing one ton of blooms			$15.54
RAILS.—For one ton of rails 1 10-100 tons of blooms are required at $15.54			$17.09
Labor in rolling one ton of rails			1.47
Labor on maintenance of mill			1.02
Cost of labor in producing one ton of steel rails from the mining of the ore, etc			$19.58

* In this statement 50 per cent. of the cost of transportation is assumed to be paid to labor engaged in transportation, this being $3 65 on the ton of pig metal. The other 50 per cent. of cost of transportation, excluded from the above table, being $3.65 on the ton of pig metal, amounts to $4 89 on the ton of rails. This $4.89 added to the labor cost of $19 58 makes the total cost for labor and freight alone in a ton of steel rails amount to $24.47.

Of course, nothing is shown as to the total cost per ton; but, as will be seen, the cost of labor is more than 61 per cent. of the *selling price* itself; while the cost of labor and freight combined is more than 77.5 per cent. of the selling price. According to this, a margin of only $7.03 is allowed to cover all expenses over and above labor and freight, and still leave a profit for the manufacturers. If anyone can figure out excessive dividends on this basis, he will deserve a medal

for his ingenuity. The facts alone are a sufficient refutation of the charge that there is a steel rail monopoly and that it is growing immensely rich at the expense of the people. The removal or reduction of the duty would not only compel the steel rail works of this country to close down but would disastrously affect the interests of labor, which enters so largely into the cost of the finished product.

THE CITIES IN THE NEW CENSUS.

Somewhat misleading statistics as to the relative population and bank clearings of American cities are given by *Bradstreet's*. The matter is the more deserving of attention in view of the generally accurate statements of that journal. By following the preliminary estimate sent out by the Associated Press some weeks since, it gives the population of Cleveland at 248,000, thus making it tenth in rank, as it stood in 1880. The fact is the population of Cleveland has been ascertained by the census authorities to be 265,000, giving this city ninth place, retiring Pittsburgh to tenth and New Orleans to eleventh. Cleveland's per cent. of increase in population during the past decade would therefore be 65 per cent. instead of 55 per cent., as reported. The only cities that show a larger percentage of increase are Chicago and the smaller cities of Milwaukee, Columbus, Kansas City, Memphis and Syracuse. With these corrections the relative growth in business and population of twenty-two cities within the past ten years would be as follows (Detroit being strangely omitted):

City.	Population.		Bank Clearings.	
	Rank.	Per cent. Increase.	Rank.	Per cent. Increase.
New York	1	25.4	1	—3 5
Chicago	2	115.	4	114.
Philadelphia	3	22.	3	60.
Boston	4	23.	2	50.
Baltimore	5	30.	7	7.
St. Louis	6	23.	5	50.
Cincinnati	7	23 5	9	—17.
San Francisco	8	29.	6	70.
Cleveland	9	65.	15	170.
Pittsburgh	10	60.	8	145.
New Orleans	11	13.7	10	10.
Milwaukee	12	80.	13	—13.
Louisville	13	50.4	12	30.
Kansas City	14	145.	11	358.
Providence	15	26.	14	165.
Indianapolis	16	43.4	18	22.
Columbus	17	78 4	16	230.
Syracuse	18	70.	22	123.
Worcester	19	43.	21	72.
New Haven	20	34.	19	33.
Memphis..	21	90.	17	170.
Springfield, Mass..	22	31.	20	120.

While it is true that population alone should not determine a city's standing, bank clearances are not always a safe index as to its business movement. Thus, in the matter of clearings, Cleveland is outranked by Milwaukee, Louisville, Providence, New Orleans and Kansas City, while no one who is acquainted with these cities will attempt to say that Cleveland does not outrank them all in wealth and industrial enterprises. The fact that there is substantially no speculation in this city will account for the lower rank taken, if, indeed,such rank, in view of the circumstances, can be considered lower.

Iron Consolidation in the Mahoning Valley.

The Youngstown (O.) *Telegram* gives the following particulars of the recent consolidation of iron industries in the Mahoning Valley: Negotiations which have been pending for some time among the stockholders of the Youngstown Rolling Mill Co., the Trumbull Iron Co., and the Warren Iron & Steel Co. have resulted in a consolidation of their interests, and the organization of the Youngstown Iron & Steel Co. The stockholders of the new company have elected the following officers: President, Henry Wick; First Vice-President, Thomas H. Wells; Second Vice-President, John C. Wick; Secretary, William H. Baldwin; General Manager and Treasurer, George D. Wick.

The general offices of the company will be located here, and a suitable building will be erected for that purpose near ths plant of the Youngstown Rolling Mill. A prominent member of the new company, upon being asked as to the object of the consolidation, said:

"It was the desire of those financially interested in these three plants to have them all under one management, and to do this it was necessary to consolidate our interests under a new corporation. With all under one management the business can be conducted in a satisfactory and successful manner and at much less expense than where they are separate."

"What improvements are contemplated?"

"As to that, all I can say is that the works will be enlarged to meet the demands of our growing trade."

"Is it the intention of this company to erect a steel plant?"

"No. The matter was under consideration and looked upon favorably, but some of the parties opposed it, and there is no present intention of the company doing anything in that direction."

CHANGES IN THE STEEL TRADE.

During the past year or two changes have been wrought in the steel trade which have proceeded quietly, but are not the less significant on that account. There has been a very notable addition to capacity, both by the construction of new works and by the remodeling of old plants. To some extent this has been counterbalanced by certain influences. Nominally the rail capacity of the country is enormous. Actually it is far from being so great. To-day there are only nine concerns turning out rails in any quantity. Some of them may, before long, follow the example set by Troy, Cleveland, Worcester, Vulcan and Springfield, which have practically withdrawn from the rail trade, to which they would only return in seasons of very heavy demand. Some of the old established rail mills have unquestionably failed to keep up in their equipment with the progress of the past decade, and they will soon be forced to face the question whether they mean to stay in the business and build practically new plants or whether they will devote their equipment to other purposes. The Illinois Steel Co. have only lately completed what is practically a new rail mill, and will move the old North Chicago works, only a few years since one of the crack rail mills of the country. The Pennsylvania Steel Co., in their move to the sea, will concentrate their rail manufacture there, and give their older plant in Central Pennsylvania over to other purposes.

The point has been reached in rail manufacture that there is little chance for a mill which is not capable of turning out 800 to 1,000 tons a day, and it will not be long before the latter figure is the minimum.

There is one feature, however, which will tend to operate against rapid expansion of daily product. It has become more noticeable from year to year, and particularly so lately. The demand for rails contains a larger percentage of renewal orders. These are relatively small, as compared with the blocks which are purchased for new lines of railway. Since, unfortunately, every road has its own sections, the frequency of small orders involves changing of rolls, with its attendant lowering of product.

The enormous consumption of steel for other purposes, chief among them being the wire trade and its allied industries, has robbed the rail trade of much of its overshadowing importance in this country. At one time the fluctuations in the demand for rails controlled the entire trade. They are very important still in their influence. They may in fact again become the determining factor under special conditions. But the rail requirements now call for only a part of the steel and the raw material from which it is made.

Rail manufacturers are now generally, we believe, departing from the policy pursued by them of regarding the soft steel trade as a welcome adjunct to the rail business when the latter happens to be slack, to be promptly dropped as soon as orders for rails are taking care of capacity. The tendency is to utilize for that purpose older parts of the plant, and to provide for rail manufacture equipment specially designed for the purpose.

The course of development, during the past ten years, in the rail trade has illustrated in the most striking manner what a tremendous destruction of capital our rapid progress in mechanical appliances involves. Costly machinery is obsolete long before it is worn out. Those manufacturers only can hope to survive who write off in the most liberal manner, or who spend annually large sums in improvements. Few realize how large they are with some of our progressive iron-masters, but the contrast is painful when visiting the works of those who have failed to do so. They may be interesting as monuments of past practice, but must ultimately prove a dangerous drag on the resources of even the wealthiest concerns.—[Iron Age.

Recent Patent Decisions.

TRADE MARK.—Commissioner's decision Ex Parte Chichester Chemical Co.; registration of a trade mark consisting of "the *Red Cross* on black ground, in a diamond-shaped border and accompanied by the words Red Cross" for a medical compound. The examiner rejected the application because the name "Red Cross" and symbol of a red Greek cross have been adopted by the celebrated International Red Cross society, and are used upon its hospital supplies, medicines, etc., and because the employment of the name or symbol would be an attempt to profit by the reputation of the society, and, therefore fraudulent. The Examiner's decision was upheld.

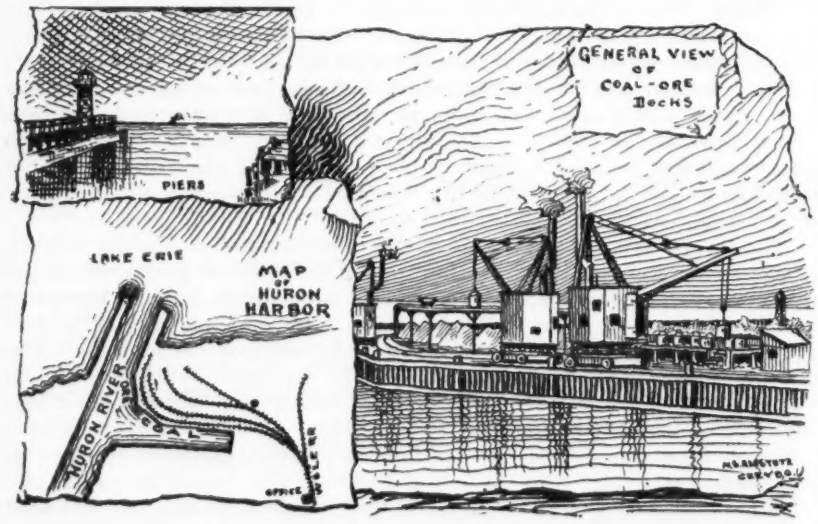
EX PARTE HURLBUT.—Certain claims were rejected on a prior English patent. The applicant, without admitting or denying the pertinency of the reference, filed an affidavit in supposed compliance with Rule 75, the object being to show a completion of the invention in this country prior to the date of said English patent. Examiner held that the affidavit was not sufficient in itself to overcome the reference and that the drawings should be filed, and that affidavits of the people to whom the drawings were disclosed should be filed. *Held* that the Examiner's decision should be sustained so far as it related to drawings, and further *held* that the affidavits aforesaid need not be furnished.

TARGETS.—The Peoria Target Co. *vs.* the Cleveland Target Co. Reissued Letters Patent No. 10,867, dated September 13, 1887, issued to N. Grier Moore, administrator of Chas. F. Stock, declared valid. When it appeared that the attorneys whom the inventor employed to prepare his application, either through mistake on their own part or from want of clear description on the inventor's part, failed to state the claims as broadly as the device and the invention justified, and that the inventor was in poor health and his circumstances such as to explain his claim that his application was not carefully examined before being forwarded, and there was evidence to show that when the original patent was issued he recognized its defective features, made complaint concerning it and stated that he proposed to have the error corrected. *Held*, that there was such mistake as the statute contemplated and that proper means had been taken to correct it by the reissue. The title to said reissued Letters Patent declared to be in complainant. The first, third and fourth claims of said patent held to have been infringed by defendant.—[U. S. Circuit Court, Northern District of Ohio.

LAKE ERIE PORTS: THEIR COAL & IRON ORE HANDLING FACILITIES

VII—HURON.

The Wheeling & Lake Erie railroad affords the rail connections from Wheeling and the Southern Ohio coal fields to the lake maritime shipping interests, finding Huron in the loading or unloading of cargoes amply provided to take care of the business entrusted to this port. The entrance to the river is protected by two piers of the crib type, the westerly one being provided with a lighthouse. These piers, to be more efficient, should extend quite a distance farther out, into deeper water, thus obviating the forming of sand bars across the river's mouth, just at the end of the piers. These bars form at seeming regular intervals, and present dredging, with short piers, must be periodically kept up, where if they extended into deeper water, no doubt the channel entrance would have a sufficient depth at all times. Mr. B. A. Hudson is collector of this port. Only a short distance in from the end of the Eastern pier the Wheeling & Lake Erie railroad have constructed a slip, extending at about right angles to the river itself. Upon the north front of this slip are their coal handling facilities, and near the entrance to the slip, adjoining the coal plant and extending a short distance on the river front, is the ore storage space. The ore unloading facilities consist of rotary hoists which dump their buckets into dump cars which traverse two traveling bridges upon suitable overhead trestles. These trestles extend over the ore storage space and they take up very little room thereon, and withal effect the results aimed at better than if the dump car tracks were stationary upon the trestles and not movable thereon in a line parallel with the dock frontage. The arrangement allows of adjusting the traveling bridges, with respect to



each other and to the varying distances vessel hatches are placed to each other These ore handling facilities have a frontage of upward of 275 feet, by 100 feet wide. This area is exclusive of the necessary tracks, etc., and affords storage room for 30,000 tons. The trestles have recently been repaired and the floor area also renewed in places where the same needed attention. The ore receipts for the last number of years have gradually fallen off, no doubt due to the forming of the bar across the river's mouth, and an inadequate amount of appropriations and necessary dredging to allow of the entrance of the largest lake vessels. Once across the bar the depth of water in the river and adjoining docks is ample, there being near 16 feet in the slip and from 17 to 22 in the river itself, while the old trite saying that the entire endurance of any structure or mechanism is the strength of its *weakest* point, so in this instance—the depth of the harbor is only that of the shallowest portion, in its entrance. This state of affairs should call for earnest and adequate congressional action, commensurate with the needs of this port. No doubt because of the above conditions, the ore receipts have dropped from 44 021 tons in 1886 to below 1,000 tons—680 gross tons—in 1889, as given by the last year's report of the Buffalo Merchants' Exchange.

These conditions, however, bid fair to be entirely reversed ere another year passes by. The Huron Dock Co., which has Mr. E. W. Oglebay, of Oglebay, Norton & Co., Capt. Thos. Wilson and others, of Cleveland, as stockholders, propose the erection of extensive handling facilities at Huron for ore traffic. The Wheeling & Lake Erie railroad will build the docks, and probably $100,000 or $125,000 will be expended before navigation opens next Spring. A few hoists will yet be erected this year, but active operations will not commence until next Spring. We also understand that appropriations will soon be in force to remedy the bar formations.

The coal frontage is 1,000 feet by 100 feet wide, having a daily capacity of 1,000 tons, using four rotary hoists, which are employed interchangeably in both the ore and coal traffic. Their yard room has space for 300 cars. We herewith quote from the Buffalo *Express* a notice referring to these facilities

"The propeller Robert Mills took on a load of 2,000 tons of soft coal at Huron, O., this week, in two days, which is reckoned remarkably good time. The owners of the Mills speak in the highest terms of O. C. Stedman, agent for the Wheeling & Lake Erie railrord at Huron, who had charge of the loading. He is one of the most energetic and accommodating of men. They add that if the road would build a platform, costing a matter of $200, for the use the coal handlers, they would have the fastest soft coal dock in Ohio. Huron has the misfortune of its harbor filling up badly when northeast storms come down upon it."

Mr. Stedman has been connected with the railroad company at this place since 1884, the railroad being constructed in 1883. We are very much indebted to him for assistance in writing this article. Winthrop H. Wright, at present a large land owner, is a son of Jabez Wright, who was agent for William Winthrop, of Connecticut, who at one time owned nearly all the land in Huron township. He came to Huron in 1808. Mr. Tower Jackson is also an old resident, coming here in 1819. Both of these gentlemen were early associated at Huron in developing its commercial pursuits. Considerable shipbuilding was done in 1828, the steamer Sheldon Thompson, of 242 tons burthen, being launched in that year.

NOTE.—In last week's article on the dockage of Cleveland we unintentionally did an injustice to the Cleveland and Pittsburgh Railroad coal handling facilities, when we referred to their daily capacity as being 1 320 tons. The table should have given 3,000 tons instead, as we are informed by General Agent John Thomas, which will correspondingly increase the aggregate daily capacity of Cleveland some 1,680 tons, making a total of 12,200, instead of 10,520 as given in our table.

VAPOR STOVE MANUFACTURERS MEET.

Meetings of the United Vapor Stove Manufacturers and the Vapor Stove Manufacturers' Association of the United States were held in Cleveland the present week. The new officers of the former are: George Kahle, of St. Louis, President; Paul Schneider, of Cleveland, Vice President, and F. L. Alcott, Commissioner. For the latter organization the following officers were elected: President, Hon. D. A. Dangler, of the Dangler Stove & Manufacturing Co., Cleveland; Vice President, Paul Schneider, of the Schneider & Trenkamp Co., Cleveland; Commissioner, F. L. Alcott; Executive Committee, George Kahle, St. Louis; W. Brandon, St. Louis; Garson Myers, Chicago; H. Trenkamp, Cleveland, and Charles A. Pope. The principal business was arranging price lists and discounts.

Growth of the Canning Industry.

It is only a few years, comparatively, since the canning industry began to receive attention, yet, like everything else, it has increased with remarkable rapidity, says the *Manufacturers' Gazette.* In 1889 there were over 1,900 canning concerns in operation, scattered over the broad domain of 44 States and 6 Territories. Maryland leads the list with 598, Maine next with 152, Virginia next with 120, New York 68, New Jersey 68, with Ohio, Pennsylvania, Delaware and Illinois next in order, employing in various capacities over 1,000,000 people, and using the product of over 1,000,000 acres of land. Fifteen million cases, in round numbers, was the estimated output of these canneries in 1889, which figured at the minimum of current cost amounts to $25,000,000. Of this vast sum $15,000,000 at least were paid to the farmer for his products, and yet this business is still in its infancy. What the future is to give in this direction no one can imagine.

THE French government has made the manufacture of gun cotton cartridges a State monopoly, and has fixed their price for the coal mines at frcs. 4 per. 1 kilog., say 19 cents a pound.

INCREASING CLEVELAND'S ORE DOCKAGE.

TO THE EDITOR OF THE IRON TRADE REVIEW:

The demand for more stowage for iron ore and coal has become one of the greatest importance to this, the second great city upon our inland seas. As a preliminary move in providing additional stowage, many of our citizens and the daily press have fixed their attention upon opening a channel through the shore arm of the breakwater, this, however, with the additional object of creating a current through the Harbor of Refuge for sanitary reasons. In regard to this last point I wish to say a word.

Of course the ultimate discharge of the water of Lake Erie and the streams entering it is over the Niagara Falls eastward; but, owing to varying winds and an irregular coastline, the current at Cleveland is not always, perhaps not generally, eastward. Hence, for a portion of the time, the discharge of the semi-liquid matters from the Cuyahoga river would find its way through the proposed opening of the harbor opposite the intake of our water works and at times ultimately find its way to the present crib, and very likely to the proposed new intake two miles farther out. In short, I believe more would be lost than gained in the purity of the water in the west end of the harbor and beyond.

In the matter of navigation, it seems to me that the present entrance to the harbor is all that can be desired. A year ago you did me the honor to publish a plan of some dock improvements which I have for a long time advocated, with some incidental observations on the matter of opening out the river bed. This latter project seems to be abandoned, at least for the present, so we will let that pass. The main object of this article is to call attention again to increased dock facilities.

Just now our attention is called to our lake front by the discussion of a like question at Chicago, the first great city of the lakes. In your issue of the 7th inst. you present some startling figures of the prospective value of the lands Chicago proposes to reclaim for the Columbian fair primarily. The value of such property in the first great city of the lakes is doubtless greater than in the second. If we take in as much of our surrounding country as Chicago does, our population would approach very nearly to one-third of her population. I think I am safe in saying that our redeemed lands would be worth at least one-half that of Chicago for a like purpose. You say, "of course the owners of property in the present business district would be ruined" by this addition of 11,000,000 square feet to the present 14,000,000 square feet of the business property of the city. I hope this principle is not what stands in the way of improving our lost lands. Let us look a moment at this "of course" and see what foundation it stands upon.

Chicago has doubled her population in the past ten years, and is in a fair way to double it again in the next, and would require double the business territory that she has now. The value of a thing depends mainly upon the supply and demand. Would a demand for fourteen millions of additional feet be "ruined" by an additional eleven millions? No. I own lands upon the river bed flats, and I should consider that the value thereof would be greatly increased by the recovery from the waste of waters of a hundred acres in front of it.

Nothing would add more to the value of our inside property than the occupation of our outlying wastes by an additional quarter million. The extent of our lost lands, west of the river and inside the breakwater, is more than one-half of that Chicago proposes to reclaim, worth as much, as the *Review* estimates it, as $500,000,000. These figures are a little too great for the people of Cleveland to claim as yet. But we may safely say that this 6,000,000 square feet reclaimed and docked would be worth $1 per square foot, $6,000,000, and it will cost much less than $1,000,000 to reclaim and dock it.

These lands are worth nothing as they are. But this 140 acres reclaimed will furnish all the dock room required to hold our ore trade here, and is perfectly accessible to the Erie, the Baltimore & Ohio and all the Vanderbilt roads centering here; and the belt line in contemplation would let in all roads that may hereafter seek the Lake at Cleveland.

It matters little who owns these lands if they will improve them. But if Chicago and San Francisco own their submerged water fronts, it is difficult to see why the State and General Government cannot authorize the City of Cleveland to reclaim this quarter of a mile in width of the Cuyahoga belt.

East of the river a like amount may be reclaimed between the river and Muirson street. Chicago is working up to the value of her lake front. As storage for ore and fuel, for ship yards and mills, Cleveland dockage is worth as much to her as Chicago's is to her for a like purpose. This improvement would give Cleveland marine facilities second to none upon the lakes, and enable her to maintain her second place, without it she might as well move to Huron or Black River.

The westerly winds have already filled some acres in the west end of the Harbor of Refuge, and the Lake Shore Road is beginning to utilize it; this is well. If the other roads will provide storage room here for themselves, the commercial interests of the city will be subserved. But if the city itself should reclaim these lands as fast as they are needed, and lease them at a rent barely sufficient to pay the interest on their cost and the cost of maintenance it will be a strong inducement for manufacturers and commercial men to occupy them.

J. H. SARGENT.

Action of the Board of Trade.

On Monday last, at a meeting of the Cleveland Board of Trade, Hon. George H. Ely, Chairman of the Committee on Lake and Harbor Improvements, presented the following report of importance to the commercial interests of the lakes:

The Committee on Lake and Harbor Improvements respectfully submits to this board the following statements and recommendations in relation to the necessity for enlarged accommodations for the rapidly increasing business of Cleveland harbor. The tonnage movement of our great lakes system has, within the past few years advanced with enormous strides. Even with obstructions in many of its channels, insufficient depth of water in its harbors, and with a single lock at the outlet of Lake Superior, the interchange of primary products, such as coal, iron ore, grain, and lumber, on the lakes between the Northwest and the East has become so large as to crowd and overpass (especially at Lake Erie ports) all harbor and dock accommodations.

Conspicuously is this apparent at the port of Cleveland, where an annually increasing railroad mileage, tributary to our city, immensely increases the difficulty of the situation. The want of dock room in our harbor on which to handle this rapidly growing railroad and lake transportation, has driven away permanently from Cleveland a vast amount of business of which this port is the natural entrepot.

Last week's market report of the *Iron Trade Review* gives the situation in respect to iron ore at this moment, with one-half the season's ore business yet to be done, in these words: "The docks in this vicinity are fairly jammed with ore, all of which has been sold, and the railways are vainly devising means to take care of this material, so that there isn't a ghost of a chance of storing a pound of ore that hasn't already found a market." Is it not time to open our gates to this commerce sweeping past us? To stop this loss and ultimate decay?

Every citizen of Cleveland is interested in what may yet be done, and every dictate of interest and pride in our city prompts to action in whatever direction promises relief and remedy.

It is generally believed that the opening of the old river-bed would largely increase our dock areas for handling coal, iron ore, and lumber, and especially has the public interest been turned in that direction because the cost of such opening would have to be borne, as was supposed, by the L. S. & M. S. Railroad Co., under its existing contract to construct a swing-bridge in its embankment at that point, when required to do so by the city of Cleveland.

But while a free passage between the breakwater area and old river-bed would undoubtedly secure some improved means of ingress and egress for our shipping, it would not seem to give what is of far greater importance and vital to the business of this port—an increase of dock room for the handling of products—the one essential thing most desired and needed by all vessel owners, and by the producers and shippers of coal, iron ore, and lumber.

Again, as we understand the conditions of the contract between our city and the L. S. & M. S. Co., the obligations of the latter are limited to the construction and the maintaining in use of the swing bridge. A large expenditure additional to this would be required for deep water channels, on one side, into the old river bed, on the other into the breakwater area, involving, of course, an annual expenditure thereafter for dredging. An expenditure of this kind, it is well known, is entirely outside the settled policy of the United States Government respecting all inside work. Money for these purposes will never come from the Treasury of the United States. It would have to come only from the treasury of the city of Cleveland. We do not believe that this would be sanctioned by Cleveland taxpayers.

Under all these circumstances, therefore, it is the opinion of this committee that relief from the difficulties of the present situation will earliest and probably only come from a proposition made some months ago by the L. S. & M. S. Railroad Co.

We understand that in consideration of being relieved of the obligation to construct and maintain in use the swing bridge, this company proposed, in addition to certain other undertakings, of value to the harbor, to build from its water front in the breakwater area 1,000 feet of dock, 300 feet wide, and accessible on two sides—this pier to be open for the common use of all railroads. The immediate acquisition of so considerable an increase of dock room in our harbor, followed, as it undoubtedly would be, by other constructions within the breakwater, would be an advantage to our city that would far outweigh any benefits to ensue from an opening of the old river bed, accompanied, as they certainly would be, by an increased burden of taxation upon our people.

It is the opinion, therefore, of this committee that the proposal referred to of the L. S. & M. S. Railroad Co., if now open, should be carefully considered by our city authorities and, if practicable, such an adjustment made on the basis proposed, as will, while duly protecting all substantial interests of the city, secure so important an increase of dock room in our harbor. If affirmative action in this direction should now be taken we understand that this new dock room could be ready for use on the opening of navigation next Spring.

We respectfully recommend, therefore, that these facts and recommendations be transmitted to the Mayor and City Council as the expression of this board upon this very important subject.

M. A. HANNA,
JAMES CORRIGAN,
THOMAS WILSON,
GEORGE H. ELY,
CHARLES HERRMAN.

The report was adopted with but few dissenting voices.

Dealings in Warrants for Scotch Iron.

Mr. Benjamin Hingley, M. P., president of the British Iron Trades Association, and a sponsor of the bill introduced in Parliament for prohibiting gambling in pig iron warrants, has "in the course of an interview, stated that there had long been a feeling of irritation among ironmasters at the way in which the markets were manipulated by speculators; but the association has been spurred into action by the disastrous result of the speculative fever which created the boom of six months ago and the subsequent reaction and depression in prices and demand. The bill, he said, does not propose to interfere with genuine dealings in warrants, but to make it compulsory that a seller of a warrant shall have the iron in store, and warrants shall only represent iron actually in store."

NEW BALANCED VALVE FOR STEAM ENGINES.

The accompanying detailed cuts will give the reader a very clear idea of the operations and workings of a new balanced valve for steam engines. This valve is the invention of Mr. F. I. Freeman, General Manager of the Aetna Machine Co., Warren, O., lately patented by him. It differs materially from

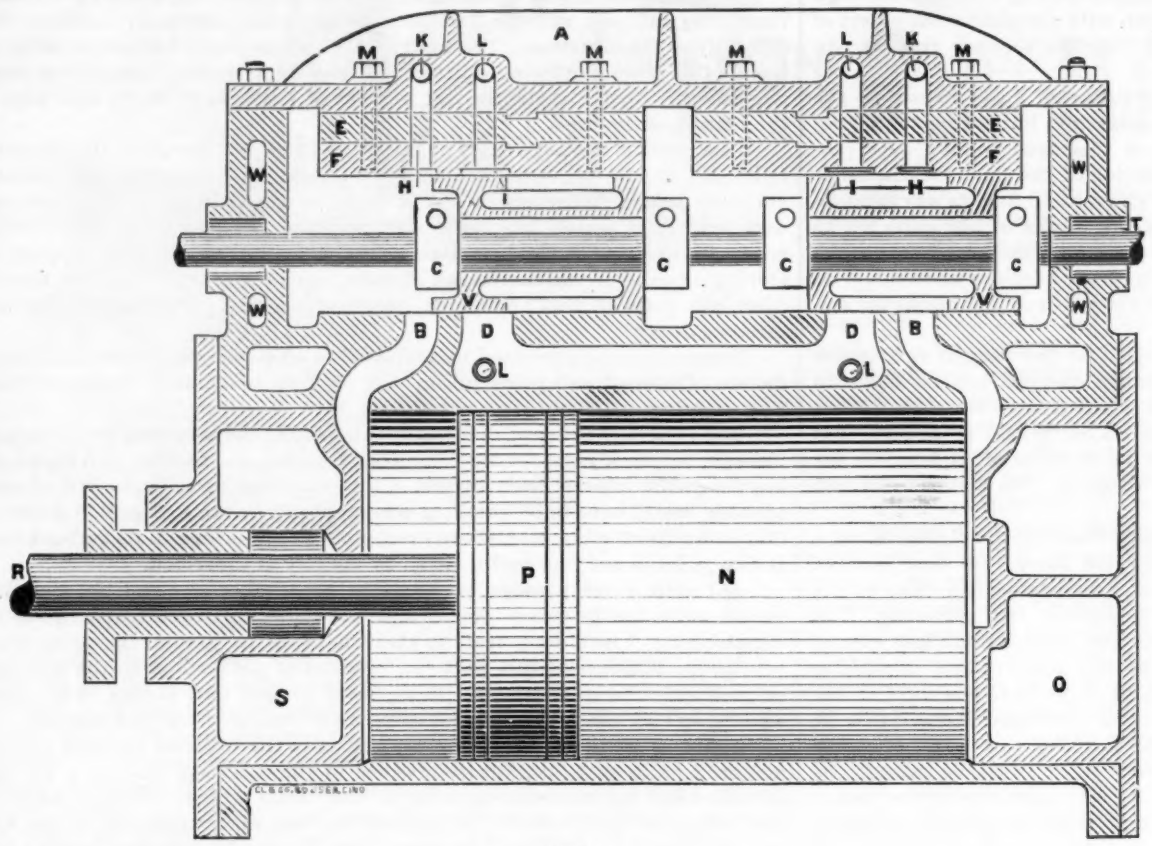


FIG. 1.

other balanced valves, inasmuch as this valve is entirely balanced under all conditions, and in any position during its stroke or travel, while other so-called balanced valves are not entirely balanced, some of them being only balanced during certain portions of their stroke, and others not entirely balanced at any part of the stroke. The reason of this is that with other so-called balance valves there must be a pressure either from springs or steam on the back of the valve equal to the area of the steam port. If it were not so the pressure on the under side of the valve, from compression caused by the steam being compressed in the cylinder in easing the engine over the center, would raise the valve from the valve seats, allowing the steam to escape and leaving nothing in the cylinder to compress. With this valve, the pressure on the face and back is exactly the same under any condition and in all positions of the stroke. By reading the following explanation, and carefully referring to the letters on the different parts, the reader will be enabled to thoroughly understand this device. It is to be remembered that the engine from which these drawings were taken is a double-valve engine, or, in other words, has a valve at each end of the cylinder. Fig. 1 represents a horizontal section through the center of the cylinder, valves and steam chest. Fig. 2, a cross section through the steam ports. Fig. 3, a cross section through the exhaust port. Referring to parts as shown in Fig. 1: A, represents steam chest lid or cover. B B, the two steam ports for admitting the steam into the cylinder. C C C C, the four clamps on the valve rod that hold the valve in position. D D, the two exhaust ports. E E, the two wedge plates between the outer valve seat and the steam chest cover for adjusting the two outer valve seats. F F the two outer valve seats. H H, two false steam ports in the outer valve seats directly opposite the steam ports in the cylinder. I I, two false exhaust ports in the outer valve seats directly opposite the exhaust ports in the cylinder. K K, ends of pipe thrt carry live or compressed steam from the cylinder into the false ports in the outer valve seats. L L, ends of pipe that carry the exhaust steam from the exhaust cavity of the cylinder into the false exhaust ports in the outer valve seats. M M M M, cap screws for holding the outer valve seats and the wedge plates in position after the valve has been adjusted. V V, the valves. W W W W, cavity for live steam in the outer walls of the steam chest. This cavity entirely surrounds the steam chest, as is clearly shown in Figs. 2 and 3. Fig. 2, K, pipe that carries live or compressed steam from the cylinder into the false steam ports in the outer valve seats. X, cap screw for raising or lowering the adjusting wedge plate. Y, pipe for carrying live steam from the main steam pipe that connects the engine and boilers, into cavity that surrounds steam chest. Z, steam pipe that connects the engine and boilers.

The outer valve seats are secured against end motion by tongues and cavities in the steam chest cover, adjusting wedges and false seats, as is clearly shown in Fig. 1. The false seats are also held firmly in position by four cap screws in each seat. These cap screws pass from the outside of the steam chest cover through the adjusting wedge plates and are screwed into the outer valve seats. The holes in the adjusting wedge plates are slotted where the cap screws go through, in order to allow them to be moved up or down to adjust the outer valve seat.

In order to adjust the valves, all it is necessary to do is first to set the valves in the ordinary way. The wedges and the outer valve seats are then placed on the steam chest lid or cover and the lid put in position, as in Fig. 2. The outer valve seat is then adjusted by means of the adjusting plate being raised or lowered by adjusting screw X until the valve moves freely between the two valve seats, just tight enough so that the steam cannot pass between the faces of the valves and seats.

The wedges and seats are then secured to the steam chest lid or cover by means of the cap screw M. The valves are then adjusted, and, as there can no steam come in contact with the back of the valve, the valve must certainly be balanced, except when the steam port is covered. When the steam port is entirely covered by the valves there is a pressure nearly equal to boiler pressure on the under side of the valves, for the reason that at this time compression begins to take place, and if it were not overcome there would be a tremendous pressu e against the under side of the valve and ace of the outer valve seat.

To overcome this, the designers simply carry the steam that is confined in the cylinper through the pipe K, Fig. 2, into the false steam port H, in the outer valve seat. Therefore, any pressure on the under side of the valve through the steam ports is also had on the back of the valve in the false steam ports in the outer valve seats. This gives exactly the same pressure on the outer side of the valve that is on the under side. Any pressure from exhaust steam is counteracted in the same way by means of pipe L, as shown in Fig. 3.

The reader will notice by the cuts that the valves are simply frames; that is, the lips on the top and bottom of the valves are exactly the same width; consequently the exhaust cavity in the valve is not covered as in the ordinary slide valve, so that when the steam is exhausting, the exhaust steam instead of creating a pressure on the under side of the valves passes clear through thevalve and the pressure is exerted on the outer valve seat.

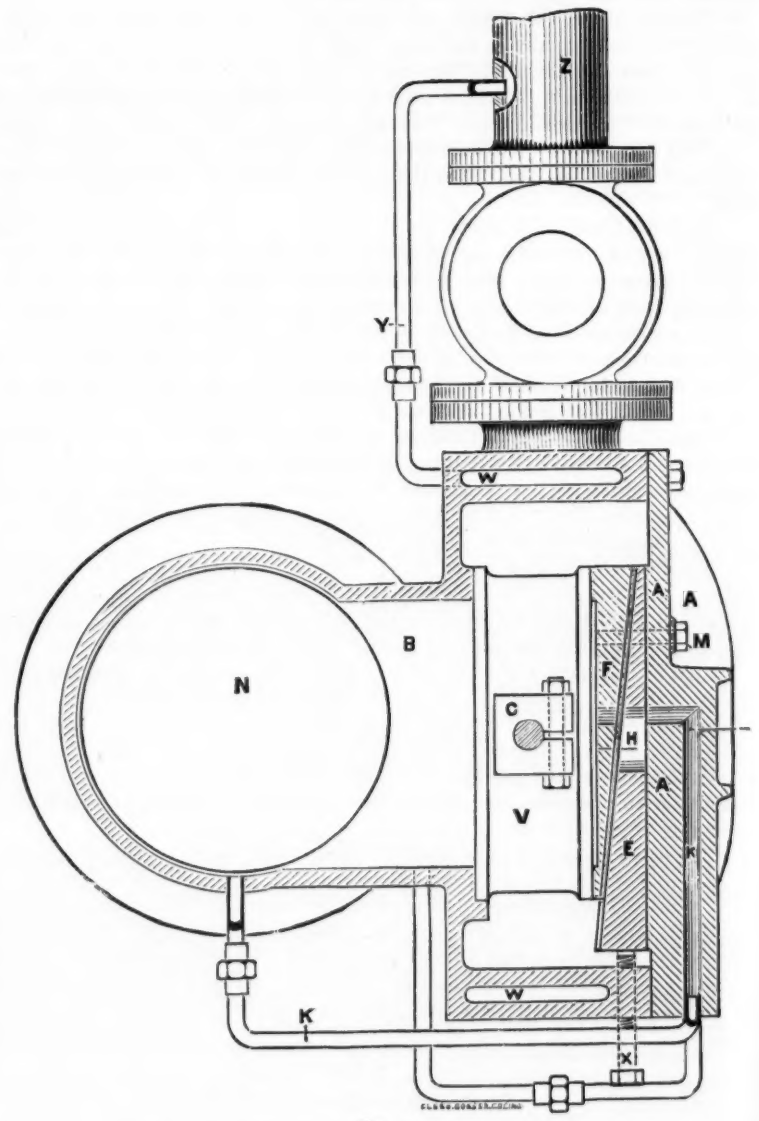


FIG 2.

The valve seats are all exactly the same width, and the valves when at work travel just a little over their edges on both sides. This causes the seats to wear evenly over their entire faces.

In cold weather, the metal in the valves being thinner than that in either the steam chest cover or steam chest, the valves might perhaps, when the engine is first started in the morning, expand a little sooner than the steam chest, owing to their being entirely surrounded by steam, and cause the valves

to stick, perhaps tight enough to cut, until every part of the steam chest and cover is thoroughly warmed up.

To prevent this the manufacturers cast the steam chest with a cavity in the outer walls. This cavity, W W W W, entirely surrounds the steam chest. Live steam is taken from the steam pipe above the engine throttle valve and carried into this cavity. This steam expands the outer walls of the steam chest, so that the valves are entirely free and would possibly leak a little instead of binding for the first few revolutions, or until the steam chest and lid are thoroughly warmed up and expanded. This overcomes the danger of

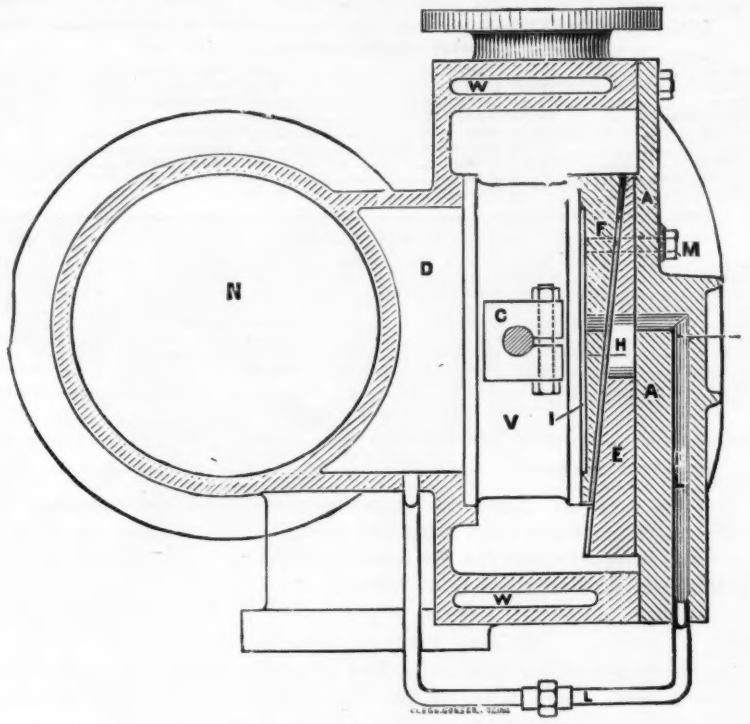


FIG. 3.

sticking, for the moment there is any steam in the boiler there is also steam in the steam pipe and in the cavity around the steam chest and the steam chest expanded so that the engine is always ready to start without danger at any time.

Electric Locomotives.

"Within ten years electricity will furnish the power for our locomotives," remarked a former railway manager and locomotive builder to the writer the other day. This seems now like an over sanguine prediction, and yet the belief is rapidly growing among mechanical men that electricity is to have a much wider application to railway operation than at present, and not a few think it possible that it will eventually replace steam. The superiority of electric motors over horses and even steam propelled cables for city transportation seems to be attested by the rapid introduction of electric railways. In Minneapolis, the other day, the writer saw a large space of vacant ground piled with heavy cast iron "yokes," which were purchased for the construction of several miles of cable railway and then laid aside, the company having decided that an electric railway would be more economical and successful than a cable road. If electricity is the cheapest and best motor for lines five, ten or twenty miles long, why may it not prove so for lines hundreds of miles long? is a natural question. The conditions and necessities of a railway for freight and passenger transportation over long distances, however, differ so much from those of a road for city and suburban passenger traffic, and that generally comparatively light, that it does not do to reason from analogy. The electric motor, as another has said, is probably the simplest and most compact piece of machinery ever made for producing power. It has a much less number of parts than the steam engine, costs less for renewal, takes up less space and requires less attention. Some of the points of comparison between a steam engine and a Sprague electric motor, each of ten-horse power capacity, are given in the following published statement:

	Motor.	Steam engine.
Number of moving parts	1	9
Number of wearing parts	5	20
Floor space (square inches)	8¼	36
Room occupied (cubic feet)	16	216
Percentage of mechanical friction	1	30
Actual H. P. percentage of indicated horse-power	100	80
Quarts of oil used per week	¼	12

These figures certainly indicate several important advantages for the electric motor over the steam engine, but the problem of furnishing the enormous power required for the movement of trains on our great railways and of furnishing it at a less cost than that of steam is yet to be solved. The remarkable success, however, which seems to have attended the application of electricity to small railways within a very short time makes it possible to believe that the same force may eventually be applied to the largest uses with efficiency and economy. But at any rate the day of the electric locomotive for general railway work has not yet quite arrived.—[Railway Age.

THE United States now produces 76 per cent. of all the iron ore that is mined, 26 per cent. of all the coal, 30 per cent of all the pig iron and 32 per cent. of all the steel that is manufactured. The world's annual production of iron ore is placed at 35,289,000 tons; of coal, 462,000,000 tons; pig iron 24,689,000 tons; steel, 10,513,000 tons. The world's production of pig iron has increased 76 per cent. since 1878, and its production of steel has increased in the same period 248 per cent., the figures for 1878 being respectively 14,117,000 and 3,021,000 tons.

WESTERN INDUCEMENTS TO FACTORIES.

The Western railroad companies are entering heavily into the movement to influence Eastern manufacturers to move West. They are issuing pamphlets setting forth the advantages of the section through which they have run. Even the customary folded time-table has remarks upon the subject, as witness the following from that of the Chicago, Burlington & Quincy Railroad of recent issue:

"Profit on manufacturing in the New England States is very small; profit on agriculture in the far Western States is also small. The Western producer is too far from the Eastern consumer; he cannot give sufficient to the Eastern producer in exchange for his product. Business is based on an exchange of products, not on money. The farmer in Nebraska has a standing offer of so many bushels of corn in exchange for a good stove; the Massachusetts stovemaker offers his stove for so much corn. The two producers are far apart. Long haulage and speculative centers are between them. The stovemaker wants to eat the corn; the farmer requires the stove to warm his home; both must work very hard to pay the intermediate costs of exchange; hence both complain that the profits are small. Exchange of products is the fundamental principle of all business. The nearer the producers are to each other, provided they produce diametrically opposite necessities, the greater the profits or the leisure. All the ramifications of trade do not alter this principle one iota. The farmer cannot move his farm to Massachusetts; the factory can, however, move to the West. On the foregoing positive economic principle, that factory located in the West must pay, always provided that the enterprise has been undertaken primarily by the man who thoroughly understands his business; that the location has been selected with prudence after earnest study of the country, both in regard to the supply of raw material and the tributary territory available for the disposition of the manufactured product; that sagacity and judgment pervade every movement concerned in the creation of the factory, and that a comprehensive business intelligence guides it toward the highway of success. The discovery of coal in the West has changed all former conditions.

"Why do Eastern manufacturers complain that their profits are cut to a smaller margin every year? Why do they say and feel that competition is becoming more and more fierce? Why does it cost so much to sell goods to their Western customers? Why do they feel that Western manufacturers are gradually eating into their trade? Why do they regret that they feel compelled to put their sons in their own factories knowing that the competition is becoming greater and greater; or why, in face of all this, do they establish their sons in branch factories in the East when the more favorable West offers a less competitive market, greater scope for enlargement, a sure field, and that development which is in itself consonant with the development of an ever growing territory? Have they hazy notions of the conditions of the West? The people who buy their goods are chiefly located Westward. There are smaller towns in the West where rent and food for employes are very cheap. There are towns where slack coal for steam purposes is sold at 90 cents per ton. There are towns where cotton can be laid down cheaper than at manufacturing points in New York State. There are towns where iron is solely wrought, that have a surplus of female labor.

"Nearly every manufacturer in the West is doing an ever increasing and profitable business, but capital is scarce for the development of all the resources of the West. All these towns are seeking to trade with industrial establishments located near them. The West will trade with the West. These towns are the concentric points of five or six railroads, distributing goods all over the United States. They have electric light, gas and water works, fine residence locations, and metropolitan comforts. Illinois, Iowa, Nebraska, Missouri and Kansas offer the best facilities and markets for manufacturing industries. There are towns that will pay a cash bonus to any *bona fide* factory locating, others that will give free sites, and others that will subscribe stock. There are towns surrounded by coal and raw material in the West right in the midst of the customers of Eastern factories, and others that have inexhaustible water power. Is it consistent with that energy which has made this great country a success to wait until others have filled the field, and then by force of economic exigencies to have to follow to secure what remains, or should this matter be given earnest consideration?

"The field for manufacturing in the near future is the West. Immense establishments, doing a prosperous business, are already located there. Let timely action be taken. The Chicago, Burlington & Quincy Railroad Co. have already established on their line a large number of prosperous manufacturing enterprises, and desire to increase the number, to the end that the population they serve may be increased, and that their unsurpassed transportation facilities be utilized to their fullest extent. They assure to those proposing to locate on their line the best possible means of communication with the rest of the world, and consider the interests of their patrons so located as identical with their own. They invite correspondence with manufacturers intending to move West, to the end that both parties shall profit thereby."—[Iron Age.

To Detect Flaws in Metals.

The schiseophone is the name given to an instrument for discovering flaws in metals, invented by Captain Louis De Place, of the Paris School of Cavalry, and described in a recent number of *La Nature*. The instrument consists of a microphone combined with a mechanical striker and a sonometer. In using the instrument one operator directs the striker over the surface of the metal under examination, while another listens at the telephone in an adjoining room. When the striker hits a point over a flaw the sound is increased, and the increase is so magnified by the microphone that the listener at the telephone can detect its presence. Tests of the instrument were made at Ermont on the rails for the Northern Railway Co., and in every case where a flaw was indicated by the instrument it was found to exist on breaking the rail.

AMONG THE IRON MINES.

Lake Superior Mining Notes:—

GOGEBIC RANGE.

Capt. W. E. Dickinson, superintendent of the Colby, says that but for the recent cave-in at the mine, the Colby's output for the season would easily have reached 300,000 tons. As it is, she will produce from 225,000 to 250,000 tons. Similar cave-ins will considerably reduce the output of several other Gogebic range mines.

The Norrie mine holds its place at the head of the shipping list this season with a determination denoting that she has no intention of forfeiting it. Her shipments next week will carry her beyond the half million mark for the season, and she has shipped over 100,000 tons by rail in addition to the the quantity sent to market by water since the opening of navigation. The Norrie is a wonderful producer, and no mistake, and gives promise of holding rank as the greatest in the Lake Superior region for some time to come.—[Marquette Mining Journal.

An Ironwood paper states that the Schlesinger syndicate is now working the Iron Chief and Sunday Lake mines, in the Wakefield district of the Gogebic range, and has options on two or three properties below Bessemer, from which facts it deduces the not unreasonable conclusion that Mr. Schlesinger and his associates are anxious to get a foothold in the Gogebic ore field. The properties they are now working in the Wakefield district figured very prominently in the market during the boom period, but have hardly been heard from since. It is probable that the Schlesinger party is engaged in developing them under an option for their purchase. But whatever the arrangement, it will be fortunate for the Gogebic iron region if the Schlesinger people become identified with it. They buy mines to operate them—not to keep in stock.—[Marquette Mining Journal.

Patrick Sullivan and George Weber, of this city, who are exploring for iron on lots 2 and 3, 40-18, this town and county, are meeting with good success, and stand an excellent chance of opening up a mine. Their exploration lies within a few rods of the Brule River, just two and a half miles a little west of north of this city. An ore formation, running east and west, has been tested for a distance of 450 feet, ore having been found in a number of test-pits ranging in depth from 12 to 28 feet. A 6x7-foot shaft is being sunk near the center of the lands under option. Ore was encountered one week ago yesterday, at a depth of 14 feet, and the shaft at the present time is bottomed in the metal at a depth of about 20 feet. Water is beginning to be troublesome, and a boiler and pump will soon be procured. Three analyses of the ore taken from the Sullivan-Weber exploration showed a percentage of 50, 58 and 62 in metallic iron. The lands are owned by the N. Ludington Lumber Co., and have never before been explored. The showing is certainly an exceedingly promising one.—[Florence (Wis.) Mining News.

MENOMINEE RANGE.

It is said that when the Hamilton shaft is equipped with the machinery that has been ordered, it will show all the iron producers of this peninsula something in ore-hoisting that will be a revelation. It is provided with four 10-ton skips, and there are those who argue that a million tons a year will be the average production. This is to be raised from a single shaft that possesses a depth of something over 1,400 feet. The ore body is reported as one of the largest in the region.—[Iron Ore, Ishpeming, Mich.

N. P. Hulst, formerly of the Menominee Mining Co., and one of the best posted and most scientific mining men in the country, was in the city Thursday, and paid a visit to Geo. W. Baird's and A. E. Guensburg's wonderful magnetic ore find on section 25, near Keyes Lake, in this township. Mr. Hulst was astonished at the apparent magnitude of the new find, which he pronounced one of the greatest showings he ever saw in the Lake Superior district. He said he had no doubt of the existence of an ore deposit of mammoth dimensions on the property, and pronounced the product first-class in every respect. Mr. Hulst believed the ore formation followed the quartzite ridge for almost an indefinite length, and that the Keyes Lake district would at no far distant day astonish the country with its richness in high grade iron ore.—[Florence (Wis.) Mining News.

MARQUETTE RANGE.

Upon his recent visit to Marquette, C. M. Howell, of Bessemer, closed up a deal in the Gogebic range, which will attract considerable attention when made public there. It will be remembered that Mr. Howell was successful last Spring in securing from the Lake Superior Ship Canal, Railway & Iron Co. an option upon one of the "Dangler" eighties, on the ground that the holders of the original option had forfeited their rights. The property was known to be a very valuable one, and the matter caused considerable comment at the time, the original holders, who at about the same time organized the Eureka company to operate the mine opened up on the other eighty, putting a crew at work and preparing to contest Mr. Howell's claim in the courts. Since that time both parties have had exploring crews at work on the eighty, but on Friday, in this city, a deal was closed by which Mr. Howell and his associates sold out to the Eureka company, represented by James Corrigan, of Cleveland, and the eighty will be incorporated with the Eureka eighty under one lease, the minimum royalty for each eighty being payable from either, a point of decided value to the Eureka company, which already has a good mine opened up on the first eighty.—[Mining Journal.

The new body of ore recently encountered at the American mine has been drifted into for a distance of 30 feet, and still retains a width of 16 feet, and the work being done on the deposit is on its top. After it has been sunk into it is thought by the captain that it will show a yet larger vein.—[Iron Ore, Ishpeming, Mich.

Lake Superior Shipments of Iron Ore:—

Lake shipments of iron ore from the mines of Lake Superior, for the season of 1890, up to Wednesday, August 20th, are as shown by the appended statement, condensed from the Marquette *Mining Journal:*

MARQUETTE RANGE.

American	202	Grand Rapids	5,245	New York	1,791
Barnum	6,098	Humboldt	10,774	Pitts. & L. Angeline	160,228
Buffalo	55,134	Imperial	12,889	Prince of Wales	16,241
Cambria	45,493	Jackson	70,757	Prout	7,448
Champion	133,853	Lake Superior	173,061	Queen	68,449
Cleveland	153,391	Lillie	20,911	Republic	122,891
Cliffs Shaft	107,202	Lucy	30,351	Republic Reduction Co.	1,115
Detroit	1,230	Marquette Ore Co.	1,057	Salisbury	56,200
Dexter	630	Michigamme	38,796	South Buffalo	72,423
East New York	19,755	Milwaukee	21,861	Volunteer	73,141
Fitch	2,744	Negaunee	41,380	Winthrop	56,439

Total, Marquette Range 1,616,352

MENOMINEE RANGE.

Aragon	16 376	Hamilton	13,881	Paint River	33,295
Armenia	17,771	Iron River	84,839	Perkins	6,059
Chapin	416,370	Ludington	48,788	Pewabic	9,036
Commonwealth	68,162	Mansfield	4,886	Shafer	30,797
Cyclops	37,993	Mastodon	41,798	Sheridan	595
Dunn	83,185	Mastodon South	514	Vulcan	74,363
Florence	116,710	Millie	20,001	Youngstown	23,065
Great Western	49,049	Monitor	9,951		
Half and Half	383	Norway	39,164		

Total, Menominee Range 1,247,031

GOGEBIC RANGE.

Anvil	20,780	Father Hennepin	8,184	Pabst	72 455
Ashland	242,257	Federal	5,982	Palms	15,492
Aurora	138 973	First National	105	Ruby	6,572
Brotherton	33,677	Germania	23,708	Section 33	50,237
Cary	38,808	Iron Belt	61,855	Superior	14,025
Colby	129,345	Montreal	6,630	Trezona	29,601
Davis	564	Mt. Hope	34,084	Windsor	18,202
Eureka	16,530	Norrie	481,968		

Total, Gogebic Range 1,446,330

VERMILION RANGE.

Chandler	198,765	Minnesota Iron Co.	308,439	Pioneer	3,523

Total, Vermilion Range 510,727
Grand Totals 4,824,898

The *Journal* says: Again this week our statement of ore shipments from the several ports of the Lake Superior region is incomplete, owing to the failure of the reports from the Wisconsin Central docks at Ashland, and from Two Harbors, Minn., to reach us on time.

Welding With the Electric Arc.

Ingenious machinery and processes for welding by the aid of the electric arc have recently been brought into notice by Mr. C. L. Coffin. The fundamental principles involved are radically different from those of the now well-known Thomson method. This latter utilizes the heating effect of a powerful current through a conductor, while the new process simply employs the enormous temperature of the arc under conditions that admit of exact regulation. As regards rapidity and perfection of work, we have not yet the data for comparison, but the arc process is found to make very satisfactory and reliable welds, and to do it quickly and economically. Its great advantage is the fact that it requires no special generating apparatus, and can be employed wherever an electric circuit, either arc or incandescent, is at hand. The magnetic blast enables the operator to keep the heat under perfect control, and to direct it as one would a blow-pipe flame. The arc is self-regulating, and the power required in the ordinary machines is but small; in fact, the welder is in this respect very nearly the equivalent of an arc lamp. For certain kinds of work the new apparatus seems remarkably well fitted by its power, cheapness in operation and convenience. It appears to be specially advantageous for welding hoops, rings, and the like, for which service it may be made nearly self-acting. It must be regarded as a very useful application of electricity to a wide and important field.—[Electrical World.

Steel vs. Wooden Railroad Ties.

The Standard Metal Tie & Construction Co., New York, furnishes the following comparative estimate of the cost of standard railroad track laid with wood and with steel ties:

ESTIMATE OF COST OF ONE MILE OF STANDARD TRACK WITH WOODEN TIES AND STONE BALLAST.

119 3-7 tons of 76 lb. rails at $32 per ton	$3,821.71
2,816 cross ties at 80 cents (first class)	2,252.80
352 joints, at $1 each	352.00
6,034 pounds spikes, at 3 cents per pound	181.02
3,400 cubic yards stone, at $1.05 per yard	3,570.00
Labor	1,800.00
Total	$11.977.53

ESTIMATE OF COST OF ONE MILE OF TRACK WITH STANDARD STEEL TIES AND GRAVEL BALLAST.

Rails as above	$3,821 71
2,112 standard steel ties, at $2.50 each	5,280.00
352 standard steel tie joints, at $2 each	704.00
3,000 cubic yards gravel, at 25 cents per yard	750.00
Labor	500.00
Total	$11,055.71

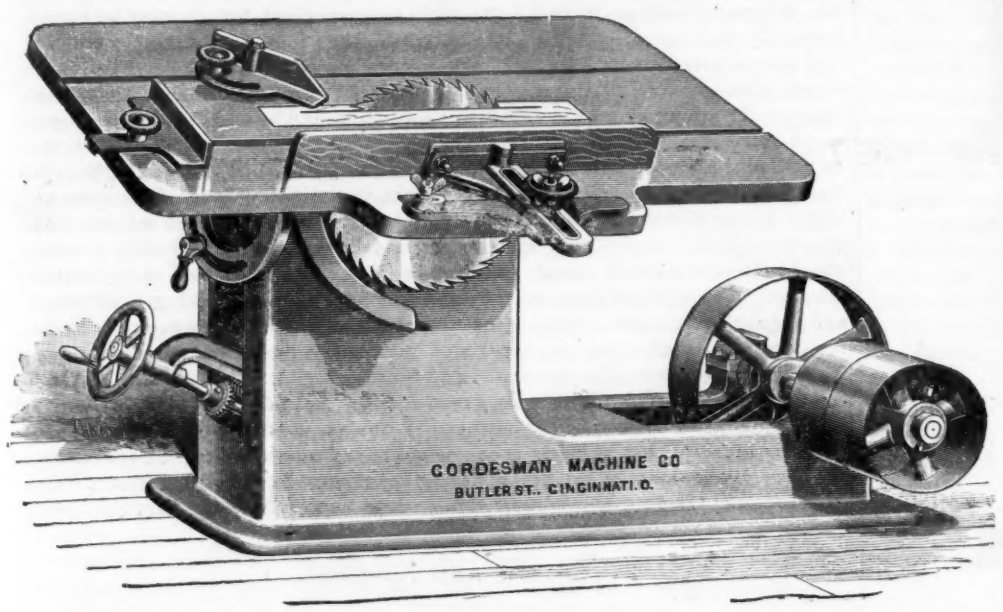
A New Grinding Material.

Crushed steel is said to be coming into use for cutting stone. It appears to be made by quenching very high carbon steel in cold water from an excissively high temperature, such as would overheat steel for most purposes. This renders it not only hard but rather brittle, so that it is possible to pulverize it; it is crushed in a stampmill, and sifted closely to size. It is said to be not only cheaper but much more effective than emery, giving a better polish and quicker, and lasting much longer.

THERE are several unusually fine illustrated papers in the September number of *Wide Awake*: "Helen's Tower," describing Lord Dufferin's beautiful devotion to his mother; "Capturing a Sea-Cow," by Dr. Hard; and "An Obscure Hero," by Edith M. Degen, giving an account of Mr. Hadley's work for the Indians. No live American boy or girl should be without this sterling publication: *Wide Awake* is $2.40 a year. D. Lothrop Co., Publishers, Boston, Mass.

DIMENSION SAW, WITH TILTING TABLE.

The demand for a machine that will rip, cross cut and make miters has induced us to build the machine herewith illustrated. It is designed especially for these purposes, and can be used to the best advantage in all kinds of wood-working establishments. In this tool we have embodied many new principles. It is heavy, self-contained, and the saw has a vertical adjustment, while the table may be tilted to 45 degrees. The frame is large and cast in one piece, making it superior in strength and rigidity to all other similar saw benches. An extension to carry countershaft is cast in it, necessitating but a single alignment in setting machine. A saw guard to prevent accidents is also provided. The table measures 4 feet long, 3 feet wide and is substantially ribbed. Grooves are planed in same for the reception of cross cut and miter fences. The opening for cutters to pass through is large enough to admit of the use of a 20 inch saw. Two turned, dove-tailed radii fitted to under side of table gives it a tilting movement and substantial bearing. Degree marks are cut in front radius indicating angle of table while being



tilted. The arbor is of large diameter, revolves in long self-oiling boxes and is made of refined machinery steel. The boxes are connected and fitted to dovetailed inclined frame, gibs being provided to take up wear. By means of hand wheel and screw the saw may be adjusted to suit various thicknesses of material, and at such an angle that there will be no variation in length of belt. The patent ripping fence is clamped to table and may be speedily adjusted to allow material up to 18 inches wide to pass between it and the saw. It has a rack and pinion movement operated by small hand wheel, and when placed in proper position it is held firmly by thumb nut. This fence is so made that it can always be kept in line with saw, or, if desired, may be swayed a little one way or the other. For cuts and prices on this machine, and cuts and prices of other wood-working machinery, address Cordesman Machine Co., Butler street, near Pearl, Cincinnati, O.

Increased Cost of Natural Gas.

During the past week considerable uneasiness has been felt in manufacturing circles in this city over the report that the price of natural gas was to be advanced, it being rumored that a general advance was to be made in prices, both in gas for domestic use and manufacturing purposes. However, the facts in the case having now been made public, it transpires that prices have been raised in but one line—window glass manufacture—and in that not to a figure which will render Pittsburgh glass makers unable to compete with those in other places, though it of course slightly increases the cost of production here. The advance amounts to $20 for each pot per month for the year, being raised from $40, the price last year, to $60 for the ensuing blast.

While some window glass manufacturers may protest against this increase in cost of fuel, yet the cost of gas, even with this increase, is below that of coal. It must be admitted that the cost of fuel to Pittsburgh window glass manufacturers is now higher than that paid by factories in other fields. During the past two years factories have been established at numerous points in the newer gas fields, and in some the terms upon which the gas was given amounted to free fuel. Even with this advantage, however, the established factories did not seem to suffer from the competition of the new concerns, and the probabilities are that even under the increased cost of gas, the Pittsburgh factories will be able to hold their own.

The *Manufacturer* has often called attention to the almost reckless waste in the consumption of this valuable fuel, as proven by the meter tests made at some of the mills about this city. In the more recently developed gas districts, where the gas was the cheapest, the waste was the greatest, and the many establishments founded on cheap gas soon found their work retarded by the scarcity of fuel. This has naturally led the gas companies to take means of measuring the gas and to regulate its sale by other than the haphazard way of charging so much per furnace, leaving the gas to be turned on four hours or twenty-four hours each day, as the user might desire. Hence it is more than probable that in the case under consideration the advance just made should prove but a step towards putting the use of gas in this industry—as the tendency certainly is in others—on the meter basis, each user paying for the amount actually consumed and no more. This is certainly a fair and equable arrangement for all concerned, and such a policy in the use of this valuable fuel must result in true economy. By thus regulating the use of natural gas, and preventing its waste, the supply will be lengthened and the extent of its application and advantages be made wider and more permanent.

The growing tendency toward greater economy in the use of the finest fuel the world has ever seen will serve to hasten improvements in the production of manufactured fuel gas. Much time and money have already been spent in this direction by manufacturers in the natural gas districts, and it may safely be predicted that when the present fuel becomes too dear to be used in the manufacture of iron and glass, a cheaper one will be found at hand—and that will not be coal.—[American Manufacturer, Pittsburgh.

FREIGHT COST IN PIG IRON.

The figures on the elements of cost in making pig iron, which have been submitted in a report of the Commissioner of Labor Statistics, contain some important features besides that of the labor at the furnaces alluded to by the *Dispatch* the other day. One of the elements which is brought out in a way that makes it of grave interest to Pennsylvania furnace men, is the comparison of the cost of transportation in assembling the materials for pig iron at furnaces in different portions of the country.

The figures on this point show that the great cause of cheapness in the manufacture of Southern pig iron lies in the low cost of transportation to bring the raw materials together. The radical difference on this point is shown by the fact that reports from eighteen Southern coke furnaces give two furnaces at which the cost of transporting the raw material is respectively as low as 29 cents and 84 cents per ton of product. These are exceptional cases in which all materials are moved in close juxtaposition; but the average in the eighteen Southern furnaces referred to is only $1 75 for freight charges on the materials. As a contrast to this, the freight charges at eleven Pennsylvania coke furnaces range from $1 63 up to $5 87 per ton of iron made; and average $4.24 or $2 50 per ton more than the Southern iron.

A portion of this cheapness in freighting is doubtless due to the fact that the Southern furnaces get their ore and coal in close proximity to each other; while the Pennsylvania furnaces as a general rule transport their ore or coke considerable distances to the point where they meet each other and are converted into pig metal. But the advantage is also seen in the fact that the Southern railroads have made low rates to encourage the industry; while the policy of "charging what the freight will bear" has burdened the furnaces of the North. A summary of the report says:

"In many cases the rate in the North is twice that charged for the same distance in the South. For hauling one ton of coke 120 miles one Northern furnace pays $1.55, and a rate of $1.35 per ton is paid for distances of 100, 125, 130 and 135 miles. Some Southern rates on the same material are: 128 miles, 75c.; 107 miles, 90c.; 120 miles, 75c. and 85c.; 90 miles, 66c., and 160 $1 15. In the case of the other materials used the same comparisons hold good."

This is a point which the *Dispatch* has urged on the public attention for some time. While the natural development of pig iron production in other parts of the country is a matter which Pittsburgh, as a pig iron consumer, can regard with equanimity, it is certainly our right that industries should not be driven elsewhere by undue freight charges on the furnaces of Western Pennsylvania. Rates of 7-10 of a cent per ton mile on Lake Superior ore, and of about one cent on coke do not appear excessive by themselves; but when we find that the Southern roads, with less business, are encouraging their local industries by less rates, we are naturally led to inquire whether the Northern roads might not do the same thing. The answer to that inquiry is found in the fact that these same roads are constantly fighting each other for the privilege of carrying the more expensive grain freights of Chicago at 44c. per mile. If these railroads can make money in carrying grain at that rate, they ought to be able to encourage the traffic on their lines by carrying the much cheaper ore and coke freights for Pittsburgh at something like the same rate. It is true that these freights are on the shorter haul. But the factor which makes the shorter haul more expensive per mile than the longer is that of terminal expenses; and, in both these classes of freight, terminal expenses are very nearly eliminated by the fact that the cars are loaded by shippers and unloaded by receivers.

It is also true that the advantage of the Southern furnaces in the low cost of transportation on raw materials is at present balanced by the large cost of transportation in getting their product to market. But this, if the advantage is permanent, will be remedied in time by the growth of mills which will turn out the finished iron in the same locality as the furnaces. These facts should impress our railroad managers with the fact that the prosperity of their corporations, as well as of the Northern industries, depends on a reduction in the transportation charges on the materials for pig metal.—[Pittsburgh Dispatch.

THE highly interesting metal coverings of gates found at Balawat about twelve years ago, which were formerly placed in a glass case in the northern gallery of the British Museum, have now been placed in the basement room, together with the other Assyrian sculptures. These gates bear incidents of Shalmaneser II.'s campaigns chased upon them. He reigned over Assyria for thirty-five years from about 860 B. C., most probably in the time of the mission of the Prophet Jonah to Nineveh. His monuments declare that Jehu, King of Israel, acknowledged his sway and sent tribute to him. The bulk of the gates alluded to must have been made of cedar or other wood. Each plate measures about 8ft. in length by 1ft. in width, and is ornamented along the edges with battle scenes, triumphal pageants, and religious peformances of the kings. These precious relics of antiquity were discovered by Mr. Rassam in a mound about nine miles from Nimroud.

THE GOODRICH SELF-HEATING FOLDING BATH TUB.

The bath tub herewith shown combines water supply, heating apparatus, bath tub and waste water exhaust in the least possible space. This combination does away with the great expense attached to putting in heating boilers, connecting them to ranges or furnaces, conveying hot and cold water (by pipes) from same to bath tub, being obliged to heat up the kitchen or furnace whenever a bath is required in Summer, besides many serious objections to the

FIG. 1.

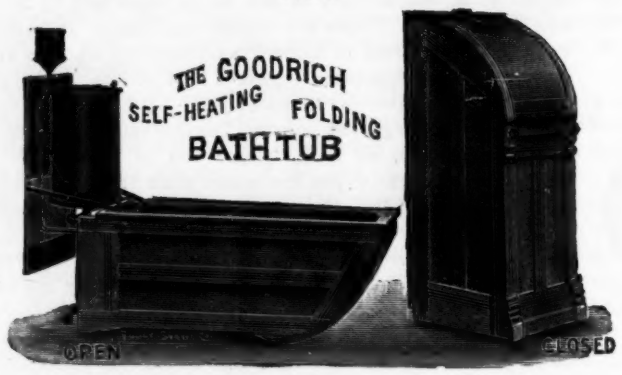


FIG. 2.

costly outfits after they are placed, in keeping them in repair. They are available for those who rent, and those who own their houses cannot always afford the great expense of building a bath room and placing those much needed articles, necessary for the promotion of health and happiness. They are built from the best material and are substantial. The front and sides are panneled and ornamented, and when the tub is folded up against the side of the room it presents the appearance of a nice piece of furniture, adding to the beauty of a furnished room.

Secured to the wall or side of room, at foot of tub, is a boiler of galvanized iron, holding about twenty gallons of water, provided with gas, gasoline, or oil burners underneath, which will heat the water in twenty to forty minutes sufficiently hot for bathing purposes. All is so arranged that when the tub is folded against the side of the room the heater is covered and obscured from sight. The waste water outlet is complete and automatic in all its workings. It is so arranged that when the tub is let down it makes connection with the waste water pipe, and by drawing an ordinary bath plug the water is allowed to run out and leave the tub dry. The outlet conveys the water below the floor, where it may be piped to any place desired.

Fig. 1 shows the American pattern, Fig. 2 the French style. For particulars address the Michigan Bath Tub Co., Homer, Michigan.

Builders' Hardware in the South.

As the demand for artistic builders' hardware extends over the country it is only natural that its manufacture should receive some attention in the neighborhood of the new centers of trade. Thus the object of the recently incorporated Basic City (Va.) Hardware Co. is to afford buyers in the Southern States a convenient opportunity to select goods without going north for them, which will result in a saving of time, traveling expenses and freight on goods. In addition to staple builders' hardware, it is proposed to manufacture real bronze, brass and nickel-plated goods, and also to make castings of any description to order.

The corporation dates from July 28, 1890, with a paid-up capital stock of $150,000, which, as the charter provides, will be increased to $250,000 as soon as the company begins the manufacture of its various classes of products. The officers are: Samuel Forrer, of Basic City, President; Daniel H. Fitzgerald, of Scranton, Pa., Vice President and General Manager; Arthur Fitzpatrick, of New York, Secretary and Treasurer; Daniel J. Sweeney, of New York, principal clerk. Mr. Fitzgerald has occupied a responsible position with the Buffalo (N. Y.) Lock Manufacturing Co., which has been in successful operation since 1872. It is this establishment, in fact, which is to be removed to Basic City and made the nucleus of the new enterprise.

The principal building of the new company will be of granite, iron and brick, rendered fire-proof by the use of corrugated iron roofing and plating. The building has been so designed by Mr. Fitzgerald that its capacity can be increased at any time, at a small cost and without causing any delay in operations. The foundry room is 200x75 feet; machinery department, 250x50 feet; finishing room, 425x37½ feet; Japan house, 50x25 feet; pattern safe, 20x12 feet. The company will erect 100 dwellings for employes. It is said that no less than 500—probably as many as 1,000—skilled mechanics will be given employment at these works. The average force at work upon the building since May 3 has been more than 200.—[Hardware.

The Square Hole Drill.

A feat in mechanics, says the London *Times*, has just been accomplished by the production of a machine by means of which square holes can be drilled in metal. Hitherto it has only been possible to drill round holes, but now square holes, and, in fact, holes of complex geometrical outline, can be drilled as easily as circular holes. There are two machines for effecting this object, one of which will only drill either round or square holes, but the other one will drill holes of any shape. The first of these is the Ainsley Oakes drilling machine, which, in appearance, resembles an ordinary drilling machine. It has, however, a spindle composed of three concentric parts, upon one of which is a set of cams, so arranged that each cam, when brought into combination with the part in which it works, produces at the cutter a hole of a given size, each cam producing a different-sized hole. In other words, in cutting a square hole, the toe of the cutter describes a square. It is not possible, without drawings, to make the arrangement clear, but it may be stated generally that the mechanical details, while very ingenious, are very simple, and the results very satisfactory. The second machine is the Tyler-Ellis drill, which is an outcome of the previous apparatus. In the Tyler-Ellis machine the spindle moves about the centre of a ball joint, and by an improved arrangement of the working parts holes of any conceivable mathematical outline can be drilled. Another point of advantage in the Tyler-Ellis drill is that it cuts clean angles in the square holes, whereas the Ainsley-Oakes drill leaves a slight filling of metal in the angles, which have to be cleared out after the hole has been drilled. It is curious to watch the machine forming a four-sided hole in a plate of metal, but it does it in a very practical and effectual manner. The value of these machines will be found in engineering workshops and shipbuilding yards, where great numbers of square holes are constantly required to be made in various parts of machinery, and would be much more frequently made were the means at hand for forming them. It is stated that the cost of drilling square holes is no greater than that of round ones, although up to the present time the cost has been as one to 36—that is to say, a square hole has hitherto cost 36 times as much as a round one to make. A demonstration was given recently by the Ainsley-Oakes Square Drill Syndicate, at 2 New Broad street, London, when both drills were successfully put through their work.

SHEARS AND PUNCHES.

Among the specialties manufactured by the Cleveland Hardware Co. are the patent wrought iron shear and punch combined, shown herewith. Fig. 1 representing the combined machine, and Fig. 2 the shears alone. They are specially adapted for cutting and punching iron and plow steel. That these machines are no experiment is easily proved, from the fact that this company have been manufacturing them for the last twelve years and have thousands in daily operation.

These machines occupy a space of 8x30 inches, when not in use, and when in use further space merely sufficient to bring down the lever; they are made

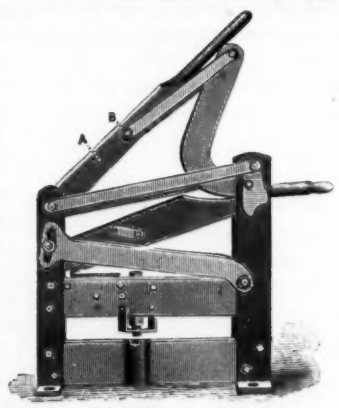


FIG. 1.

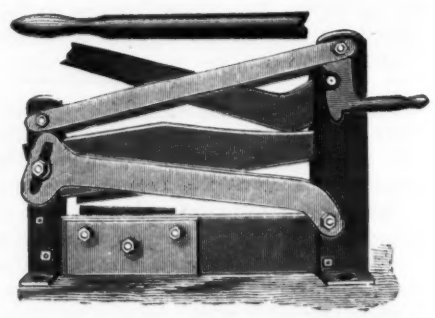


FIG. 2.

entirely of wrought iron and steel, and built so strong that two men on the lever cannot injure them; they can be repaired at any blacksmith shop, which makes it unnecessary to send to them for duplicate pieces.

The manufacturers claim for them the following points of superiority:

1st. That they are the only machines ever offered for sale made exclusively of wrought iron and absolutely indestructible. 2d. That their machines will do a larger variety, and heavier work, than any hand machine now on the market. 3d. That the price at which they are offered is lower than hand machines have been, or can be furnished at. 4th. That they are the only machines offered for sale on a positive guarantee to do the work claimed for them or no sale. Address the Cleveland Hardware Co., Cleveland, O.

A New Machine for Cutting Iron.

A new machine for cutting up round or flat iron and steel, and much needed in mill work, has been invented. It cuts round iron or steel from one quarter to one-half inch and flat up to quarter inch, as easy as one cuts a piece of card with pocket scissors. There is an opening for each size of round, while a drawing shear cuts the flat. There are several unique movements and points in connection with the machine which must be seen to be appreciated, especially the return of the blade after a cut has been made, and which is made without any springs to offer any resistance to the cutting motion. A great advantage and saving of time results from the finished manner in which the work is left after the cutting.—[Glasgow Engineer.

LOWER FREIGHTS FOR EASTERN IRON WORKS.

The Philadephia *Record* of August 21 says: The Schuylkill Valley iron manufacturers and the railroads in the eastern section of this State are baring their arms for a conflict which may mean death to the former or a pretty severe wound to the latter. The iron men are staggering under what they think is an exorbitant local freight rate on ores, fuel and finished products, and this burden, instead of growing lighter as the value of their products diminishes, is steadily increasing. The manufacturers and railroads are on the opposite ends of the "teeter." The former are going down all the time, while the latter continue to rise gradually. The furnaces have gotten into a tight place, and if the carriers do not lessen the rates they will be completely buried out of sight.

Individual manufacturers of the Schuylkill Valley have written to the Reading railroad, which does the greater part of the carrying in that section, asking for a reduction in freight charges, declaring at the same time that unless their demands are granted the furnaces will surely have to stop work. Tiring of single efforts, the representative manufacturers of Eastern Pennsylvania had a conference with the railroad officials interested, last week, in the office of the Reading railroad. At this meeting the iron men set forth the danger in which they are placed by such enormous freight charges, and asked for a general reduction on all classes of freight. They did not request any specific lowering of the rates, but asked that the Northern roads carry Pennsylvania iron and the necessary fuel and raw materials at the same rate which the Southern roads charge the Southern furnaces. This was the demand made by the manufacturers last week. A leading representative from their number said yesterday in reference to this request:

"The only hope of relief for Eastern blast furnaces is a reduction of the local rates on Pennsylvania iron, making them equal to the Southern rates by Southern roads. I do not think that our railroads will concede to us nearly so much as we asked, but they would surely not be losers in the long run if they did.

"Could we secure fairer rates, instead of the stacks in the Schuylkill going to ruin outside capital would pour in, and there would be inaugurated an era of great prosperity. Consequently, the railroads would have much more hauling to do in the freight line, not to mention a big increase in the passenger and general traffic. By their present methods they are killing us off, and pretty soon we will have nothing for them to carry. "I do not think the rates as they now exist on Lake Superior ores are too high, for it is only about one-third of a cent a ton per mile. The Pennsylvania's increase from $1.65 to $2.65 is only when that road must carry ores over the Reading's tracks. It will be remembered that about one year ago the Pennsylvania, the Philadelphia & Reading and the Lehigh Valley tried to patch up a grand scheme like this: The Pennsylvania is the only one whose tracks enter Erie. That road was to deliver ores at any junction point on the Reading or Lehigh Valley for Eastern Pennsylvania furnaces without any extra charge.

"The purpose was to monopolize the whole Erie trade, at least for a part of the haul. This was all right for the manufacturers, and we were hoping the scheme would work; but the Reading and the Lehigh Valley saw that they were not getting their share of the freight charges, and so the deal was never consummated. Now it can be seen why the Pennsylvania charges the extra dollar for ores delivered over the Reading's tracks even for a part of the distance."

Another Schuylkill manufacturer of iron said that the rates on pig iron for short hauls had increased 50 per cent. within eighteen months. The charges on ores from New Jersey and New York are about one cent a mile per ton. The freight rates, said this gentleman, never go down, but the history of pig iron shows that its price has been steadily declining.

In deference to the demands made by the manufacturers, the Reading has made, within a day or two, a general reduction on coal for the Schuylkill furnaces. The details of this reduction have not yet been fully decided upon, but a prominent official of the road said yesterday that it would not exceed 10 per cent., and very probably would not reach that figure.

Heretofore the Reading and the Pennsylvania have been working in perfect harmony in the Schuylkill regions, and if these relations are to continue the Pennsylvania will have to make a reduction similar to the Reading's. Lowering of coal rates for furnaces in other sections will probably follow the one made for the Schuylkill people, said the Reading official.

The exorbitant freight on anthracite has been compelling the manufacturers to use coke for fuel to such an extent that the decrease in the demand for this article is being radically felt by the Reading Coal and Iron Co.'s mines themselves. The policy of enormous freight rates is bearing its natural fruit, and the Reading finds itself very much in the position of the snake which is swallowing its own tail. The cost of coke has gone up rapidly during the last two years, as will be seen by the following figures, and yet the furnaces can afford to pay the big price for it rather than pay the freight on anthracite.

From November 1, 1888, to the autumn of 1889, coke sold for from $1 to $1 25 per ton. September 1, 1889, the price advanced to $1 35; October 1, it went to $1.50; November 1, it mounted to $1.75, and February 1, 1890, it leaped to $2 15, where it now remains. Some of the furnaces use 100 tons a day, and the rise in the price of this fuel makes a serious cut in the net profits. But if the railroads did not keep their freight charges so high no coke would be needed, for anthracite coal would be used, as it is preferred when it can be be gotten as cheaply as the coke.

"For Knowing How, $25."

"I paid a bill the other day," said a large manufacturer to me, "without a murmer, simply because of the way it was worded. My engineer found his hot water pump would not work, and after puttering at it for an hour sent for a machinist. He bothered with it half a day and concluded it must come apart. I was much annoyed, for that meant the stoppage of my factory for a long time. Before I gave the order to take it to pieces some one suggested that a neighboring engineer be sent for, as he was a sort of genius in the matter of machinery. He came, and after studying the pump awhile he took a hammer and gave three sharp raps over the valve: 'I reckon she'll go now' he quietly said, and putting on steam 'she' did go. The next day I received a bill from him for $25.50. The price amazed me, but when I had examined the items I drew a check at once. The bill read this way: 'Messrs. Blank & Co., Dr., to John Smith. For fixing pumps, fifty cents. For knowing how, twenty-five dollars.' Had he charged me $25.50 for fixing the pump, I should have considered it exorbitant. But fifty cents was reasonable, and I recognize the value of knowledge, so I paid and said nothing."—[United States Paper-Maker.

DANGER IN ENDORSING CHECKS.

The need for a safe and convenient means of endorsing checks for deposit has long been felt. It is unsafe to endorse your name on a draft or check, if a designing person should get possession of it. An illustration of this fact was forcibly brought to the notice of a prominent Montreal firm. It seems that their confidential man had frequently deposited checks, which were endorsed by the firm, to his personal credit in the "Bank of Montreal," and he finally conceived the idea of a big haul through this channel. The deposit was made up as usual one day, when on the way to the bank he abstracted three checks aggregating $125, and substituted a like amount of currency. He then made up a new deposit ticket, which showed the total deposit the same as made up in the office, and the entry in the pass-book agreed in amount with the duplicate ticket held by his employers, so that it was impossible for anyone to detect crookedness, even if it had been suspected. He then raised the three checks (which were drawn by prominent houses) to $30,000, and deposited them to his credit in the Bank of Montreal, after which he checked out $25,000 and decamped. We have heard of several cases where checks properly endorsed have been found and cashed in by dishonest people. The rubber stamps offer no protection, for with acids and ink erasers the "For Deposit" can be removed and a valid endorsement left, which makes the check or draft negotiable to the bearer. The only protection we have seen against this fraud is a perforating machine which cuts the word entirely out as shown below:

FOR DEPOSIT
ABBOTT MACHINE CO
CHICAGO

This endorsement is accepted by all banks, and has been in use in the Abbott Machine Co.'s office for several months. This matter should be carefully considered by every business man, as one cannot guard his bank account too carefully, likewise his neighbor's.

The Manufacture of Bessemer Steel.

The following is an extract from an interesting paper by Andrew Carnegie in the July number of the *North American* Review: "The effort to introduce Bessemer steel into the United States is nothing but a record of disaster for many years. The first attempt at Milwaukee ruined the pioneers. The works at Troy were sold for not many more hundreds of thousands of dollars than millions had been spent upon them. The Freedom Iron Co., of Pennsylvania, bankrupted itself in trying to introduce the process. The Vulcan steel rail mills, at St. Louis, were twice sold by the Sheriff. The steel rail works at Joliet were also sold by the same official. The Pennsylvania Steel Co became embarrassed, but fortunately received aid to the extent of $600,000 from the Pennsylvania Railroad Co. Even the great Bethlehem Steel Co. had to mortgage its plant. These efforts began in 1860, and all took place previous to the year 1873. It was not until that year that there was made as much as 100,000 tons of steel in all this country. Up to 1881 there never was a year during which the United States made a million tons. In that year the industry can be said to have taken firm root. The Bessemer steel manufacture was, therefore, successfully introduced only after many years of effort, and after millions of dollars had been lost. Now, this was only nine years ago. How has the rate of duty kept apace with this development? By successive reduction 40 per cent. of that upon rails has been taken off, and the bill now pending in Congress fixes the future duty at something less than one-half of the original duty imposed. Thus do we march through temporary shielding and protective care to such development as enables duties to be lessened from time to time."

THE "Ashland Steel Co." is the name of the company that is to erect a steel plant at Ashland, Ky. The stockholders of the Belfont Iron Works, the Kelly Iron Works and the Norton Iron Works are the subscribers to the stock of the new organization. The two first named companies desired to locate the plant at Ironton, and hesitated a long time, trying several plans to secure the location here where their mills were, but finally Ashland offered $100,000 bonus, and that determined the matter. So the two companies joined the Norton at Ashland, and the three together accepting the $100,000 bonus will build a plant, each organization owning one-third. In addition to the $100,000, Ashland gives a free site, either above or below the Norton mill. The steel plant will occupy as favorable a footing as those of Pittsburgh and Wheeling. All Bessemer ores come from the lakes and the Ashland steel plant will have the same freight rate on ores from Toledo or Cleveland that the Wheeling and Pittsburgh plants possess. Within a month, it is expected that the directors of the new company will be chosen, and the officers elected. Then work will begin on the plant and its completion speedily pushed.—[Ironton (O.) Register.

RESULTS OF THE PAN-AMERICAN CONGRESS.

The echoes of the recent Pan-American Conference are extremely interesting. One of the most intelligent members of the conference was Mr. E. C. Fiallos, Secretary of the Honduras Legation, with whom the following interview is printed in a recent issue of the Honduras *Progress:* In reply to the question, "How did you like your sojourn in the United States and what impressions did you bring with you?" Mr. Fiallos said:

"Well, you know of the exceptionally fine conditions in which I visited the country, consequently you can easily imagine the nature of my impressions. But even if I had not been a member of the Pan-American Conference, and as such a guest of the nation, even if I had not enjoyed the privileges and attentions lavished upon us by the Government, the local authorities, the social clubs, the manufacturers and private citizens; even if I had been treated only with the common courtesy shown to ordinary visitors, I would have brought the same feelings of admiration and esteem for the people of the North, and an intense desire that we should imitate them.

"North America, as a nation, is progressing, expanding, rising higher and higher, and with such a rapidity that fears have been expressed by thinking men that such an immense national structure will soon cease to be solid and secure; but my humble opinion is that so long as the truly democratic institutions prevail, and the same system of liberal education of boys and girls is observed throughout the country, so long as the individual worth, the self-respect, the love of peace and work are the foundation, the great structure will stand for centuries to come.

"About the world-renowned excursion I hardly need to add anything to what the newspapers have already published. That was the way in which combining pleasure and business the Government of the United States thought fit to entertain the representatives of the Latin American nations, and, of course, we appreciated it in its full value. The remembrance of the excursion will be ever pleasing to us, and a source of pride to them. The many souvenirs I brought, I shall keep to show to my friends, so that they may reciprocate the hospitality to our friends of the North.

"But it was not all pleasure and banquets and forty-days excursion for the members of the conference. They held seventy sessions, and did a good deal of work in connection with the business of the congress. There were seventeen committees at work, most of which required long and careful studies to be made in order to produce an exhaustive report, or to frame an important resolution. Mr. Zelaya, the delegate of Honduras, presided the Committee on Extradition and was member of that on Railroad Communications and on Monetary Union. He had also to furnish especial reports relating to Honduras, whenever the other committees required them."

"Which of the resolutions of the conference are of greatest importance to Honduras?"

"Nearly all of the recommendations that the conference made to the various governments are interesting to our own country, but the ones that are especially important are those relating to improved steamer communications by the Gulf of Mexico and Caribbean Sea, communication by railroad and the treaty of arbitration. What we need for national prosperity is peace, railroads and lines of steamers between our north coast and the great manufacturing cities along the Mississippi River. The construction of the Continental Railway will be one of the greatest outcomes of the conference; you know I am a believer in rails and locomotives. The statement was circulated in Washington that the Government of the United States would generously contribute to the building of the road with the steel rails required for the main line—Mr. Carnegie alone could supply them from his great mills at Pittsburgh. Congress has already decreed the appropriation of $65,000 for the exploration of the line. A convention of engineers is to meet at Washington at the end of the present year."

High Speed Engines.

The history of the steam engine is wonderfully instructive. Its growth from the rudimentary machine of Newcomen to the complex and wonderfully efficient triple expansion engine of to-day has been characterized by a series of spurts separated by periods when the art was almost at a standstill. The last of these sudden strides of emprovement has given us the modern fast-running compound engine. So far as efficiency goes little is gained by the rise in speed, for the almost theoretically perfect cycle of curves given by the beautiful Corliss type of valve gear is equaled by few and surpassed by none of its speedier rivals. At very high speeds, above 500 revolutions per minute, for example, the indicator cards generally look ragged and misshapen, telling the story of wasted steam. But the gain in rapid and perfect governing, indispensable in many situations, has been great, to say nothing of cheaper construction and greater compactness. It must be remembered that no engine governs instantaneously. Even the best forms, for instance, are unequal to keeping rigidly constant voltage on a railway dynamo, though the higher the engine speed the more chances per minute to change the cut-off. And compounding has produced a very marked effect on the efficiency, saving, even when non-condensing, something like a quarter of the steam. This means a lessened coal bill, and when we pass to triple and quadruple expansions and add the condenser, the saving is immense. But we cannot improve indefinitely along this line; the time will inevitably come when increasing friction and complication will more than offset economy of fuel. For the future Professor Thurston has, in a recent paper, given us a glance at several interesting possibilities. Of course, a very high steam pressure would help matters, but thus far the enormous difficulties of lubrication at high temperatures have effectively blocked progress in this direction. But improvements may come nevertheless, and with high pressures will come in almost necessary sequence the checking of interior cylinder condensation by the non-conducting linings mentioned in the paper before us. For very hot steam means severe losses unless checked by such devices. And yet, with all these difficulties to be met, it is almost certain that the steam engine will be considerably improved. Electricians should take a keen interest in this problem, for, of all the machines with which they have to do, the steam engine is the most inefficient. If the chances of decreasing the losses in the engine were as small as they are in the dynamo it would indeed be a sorry outlook.—[Electrical World.

A PIONEER IRON MASTER.

David Thomas, the pioneer of the anthracite iron manufacturers of the United States, was a sterling character. His biography is a record of patient toil, unwearing persistence and an iron will. His early days were spent in the mining districts of Waies, where he gained the experiences and hardihood that shaped out of so much Welsh avordupois a noble industrial figure. Here he commenced the experiments that eventually stamped his life with honor and success. He was located in Brechnoesshire, on the southern rim of the only anthracite coal basin in Great Britain, and in company with George Crane began to experiment with the coal in the smelting of ore. The first effort was a failure, the second made in 1825 was ditto, and the third made in 1830 spelled the same old word in the industrial dictionary.

In the year 1834 the manager of the Glasgow Gas Works discovered the use of the hot blast. His pamphlet was the key to a mystery, and when it came into the hard hands of David Thomas it was in faithful trust and keeping. He went to his old task again; three failures had delayed, but had not in any sense disheartened him. He went to work at furnace building; it was blown in and the output was a success. Industrial faith had its reward, and the fact established that has given bread and shoe leather to thousands of men and women, that iron could be made with the use of anthracite as fuel.

In 1839 David Thomas came to Pennsylvania, in the employ of the Lehigh Coal and Navigation Co. They wanted to repeat the Welsh experiment. Its success would make the iron ores piled along the Lehigh of commercial value, and the anthracite of Carbon county the help-mate of a giant industry.

Erskine Hazard, of Philadelphia, found out Thomas in the Welsh hills, and his services were secured for five years, on a basis of house rent and fuel gratis, and two hundred sterling as an annual stipend till the first furnace on the Lehigh was blown in and its output was good iron. If the experiment proved a failure, the agreement was null and void, and Mr. David Thomas, wife, children and chattels would be returned to Wales at the Lehigh Company's expense.

The furnace was built and blown in on July 3, 1840, and its first run of iron made on July 4th, just fifty years ago. The preliminaries had been harsh and discouraging, and every phase of difficulty was encountered; but in the inflexible and resolute worker there was enough of Cimbric granite to stand a Lehigh washout. In such a dogged, determinate man an Andes was but an ant hill, and his faith in the outcome too steady a light to be blown out in the whistle of a Pennsylvania wind. The David Thomas energy was not intermittent nor of the common millinery type that is fringed at the edges and threadbare in the center. He built his furnace of fire brick imported from Wales, and its two cylinders were made in a Southwark foundry, London, there being at that time no foundry in the United States of sufficient capacity to cast the cylinders required. This furnace was 12 feet high, with 12-foot bosh, and operated by a breast wheel 12 feet in diameter and 24 feet long. The motive power was the water of the canal.

This furnace was in blast till the floods of 1841 extinguished the fires, it having run for six months, with an output of 1,088 tons. No. 2 furnace was blown in in November, 1842. No. 3 in 1846. Nos. 4 and 5 in 1859, and in 1867-68 No. 6 was added to the plant.

From 1839 to 1855 David Thomas acted as superintendent of the famous Crane Works, till the formation of the Thomas Iron Co. gave his energy and experience a new direction. His success in this, as in his antecedent efforts, was due to the basic virtues of intelligence, thoroughness and unlimited faith in hard work. In the pig iron industry he was a prominent front man, and he had his justly deserved share of its emoluments.

Fifty years of industrial progress places Pennsylvania in the van of the iron and steel industries, not only of the Western hemisphere but of the world. It is the Vulcan of the planet. In the fires of its forges and the chambers of its mines, and in its magnificent output of metal, crude and manufactured, it has as yet no peer, and among its pioneers none have had a stronger hand in building up its iron fame by the virtues of persistence and a steady indomitancy of purpose than David Thomas, the lone figure of 1839 at Catasauqua.—[Age of Steel.

A Check is not Cash Payment.

The Supreme Court of Minnesota has lately rendered a decision of much interest to the business community, in declaring that bank checks are not cash, and do not possess legal value as money until cashed. In other words, the giving of a check on a bank is not a payment when passed between debtor and creditor, but only becomes so when the money is received on it.

The court holds that in accepting a check from a debtor there is no legal presumption that the creditor takes it in absolute payment, but only conditionally, or as a written acknowledgment of the debt. Where goods are sold for cash on delivery, and the purchaser tenders payment in a check or draft on his banker, such payment is only conditional; and the delivery of the goods, if made, is also conditional. If the check is dishonored on presentation, the seller may retake the goods for the purchase money, even from the possession of a third or innocent party, unless it can be shown that the seller has been guilty of such negligence as would estop him from recovering in equity.

This decision is among the first rendered by higher courts that is so far-reaching, and if supported by other high tribunals will settle a mooted question in commercial circles. The same principle has been applied to unpaid notes by one or two courts, which have held that the seller does not lose his lien, for purchase money, on goods sold, until he receives the actual cash, and may retake at any time prior thereto if the indebtedness be not met at maturity.

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INDUSTRIAL SUMMARY.

New Enterprises:—

A large new iron furnace is being erected at Radford, Va.

A stove foundry will probably be erected at Kingston, Tenn.

Ground has been broken for the Sheffield, Ala., Foundry, Machine and Boiler Works.

Beard & Son, of Greenville, S. C., will erect a foundry and machine shop at Spartansburg, S. C.

J. A. George has prepared plans for a three story machine shop 60x001 feet and a foundry 30x50 feet at Rome, Ga.

The plans for the new furnace and rolling mill to be established at Shenandoah, by the Shenandoah Furnace Co., are about ready to put into execution, and work is expected to begin in a few days.

The Eaton & Prince Co., Chicago, has been incorporated to manufacture elevators and do a general machine shop business; capital, $125,000; incorporators, Thomas W. Eaton, F. H. Prince, James M. Walker.

The Proctor Steel Tower Co., Chicago, has been incorporated to erect and operate towers for scenic and scientific purposes; capital, $2 000,000; incorporators, A. P. Davis, E Morton White, David R. Proctor.

The Wheeler Manufacturing Co., Chicago, has been incorporated to manufacture architectural iron, brass and bronze work; capital, $12,000; incorporators, E. L. Wheeler, E. E. Wheeler and A. J. Mostchman.

H. M. Lewis, of Hamilton county, O., and J. S. Pessenger, of Kings county, New York, have incorporated at Covington, Ky., the National Railway Forging Machine Co., to manufacture railroad forgings. The capital stock is $200,000.

The Minnesota Iron Co. is building a new machine shop at Tower. The machine department will be 80x45 feet, the blacksmith department, 60x45 feet, and the carpenter department 72x45 feet, with solid fire walls separating them.

The Stanly Land & Improvement Co. have been formed at Stanly, Va., to erect an Iron Furnace, a spiegel furnace and a rolling mill. The company have a capital stock of $2,000,000, and own 5,000 acres of mineral land, on which mines are to be opened at once.

The Ashley Wire Co., recently located at Joliet, Ill., are putting in the foundations for a main building 195x278 feet in size, to be built of stone, brick and iron, and a warehouse 100x100 feet. It is expected that the mill will be in operation by November 1.

The Rome (Ga.) Rolling Mill has been purchased for $38,500 by B. A. Jenkins, of Knoxville, Tenn.; J. J. Reed, D. R. Beynon and others, who have incorporated the Rome Cotton Tie Manufacturing Co., to operate the same. The capital is $50,000, and the plant will be enlarged.

A. E. and D. J. Huddleston, of Greenbriar county, W. Va., are reported to have bought about 1,000 acres of ore land in the vicinity of Covington, Va., and announce their intention of forming a company to put the property under development. Their company will establish several iron industries.

The Iroquois Furnace Co. has taken out a building permit for the erection of a blast furnace at South Chicago. The members of the company are Youngstown and Pittsburgh capitalists. The leading spirit is S. Frank Eagle, of Youngstown. Plans have been prepared for one furnace, but it is expected that others will be added in due time.

C. N. Parker and H. W. Topping, of St. Paul, Minn., have recently leased the Union Pacific Railway Co.'s foundry at Albina, Ore., for a term of five years. They are lessees of the Northern Pacific Railway Co.'s foundry at Brainerd, Minn., and are also operating a foundry at Tacoma, Wash., in connection with the same company's new shops at that point. This firm will now make all the castings for the entire Northern Pacific system and for the Pacific Division of the Union Pacific. They have long been prominent among Western foundrymen, and are now more conspicuous in the trade than ever.

Enlargements, Additions, Removals, Etc.:—

The capacity of the Cleburne (Tex.) Foundry & Machine Shops has been doubled.

The company operating the New Cumberland (W. Va) Foundry & Machine Shops contemplate increasing its capacity by erecting a new building and putting in new machinery.

E. Burd Grubb, of New Jersey, is the President of the Lynchburg Iron Co., recently reorganized under a new charter. The furnace of this company is now undergoing extensive improvements.

The Fuller & Johnson Manufacturing Co., of Madison, will remove its plant to Milwaukee, Wis. This was decided upon on the 16th inst. This company manufacture farm implements and machinery, and employs 300 men.

The Juniata Iron & Steel Works, of Shoeberger & Co., at Pittsburgh, which have been idle for nearly two months, will resume operation during the present week. During the stoppage extensive repairs and improvements have been made.

The Braddock Wire Co., of Pittsburgh, have about completed the erection of a wire nail factory at Rankin Station, Pa., which was put in partial operation last week. The new factory contains about 100 wire nail machines, and when they are all in operation they will produce about 1,500 kegs of wire nails per day.

Fires and Accidents:—

The Jefferson Iron Works, at Steubenville, O., were partly destroyed by fire on Tuesday. The rolling and heating departments and one fire proof nail factory were the only portions saved. The loss is estimated at $100,000; insurance, $63,000. Over 400 persons are thrown out of employment.

A serious accident occurred at blast furnace No. 2 at the Joliet Works of the Illinois Steel Co. on the 12th inst. The fire-brick lining of the furnace, which had been in use for two years, gave way and the molten metal running out exploded when it came in contact with the water around the base of the stack. Considerable damage was done to the plant, one man was instantly killed and another was fatally burned.

The iron foundry belonging to the Humphrey Machine Co., Keene, N. H., was recently burned, with a stock of valuable patterns. Loss about $10,000, with no insurance.

General Industrial Notes:—

Attention is called to the advertisement of the Jenney Electric Co., of Peoria, Ill., on page 20.

The H. W. Johns Manufacturing Co., 87 Maiden Lane, New York, have issued a neat pamphlet setting forth the merits of their asbestos roofing.

The Chester Rolling Mills, of Chester, will hereafter be known as the Wellman Iron & Steel Co. The stockholders will also vote on a proposed increase in the capital stock.

The Aetna Machine Co., Warren, O, on August 12th made a contract with the Crown Fire Clay Co., Canal Dover, O., for a 200 horse-power engine for their new fire brick plant which they are now building in that city.

Simmons & Barnhill, of Bellaire, O., have fitted their boiler shop with the necessary machinery and appliances for making converters for steel plants, and are now building a set for the Bellaire Steel Works and another for the Wheeling Steel Works, at Benwood, W. Va.

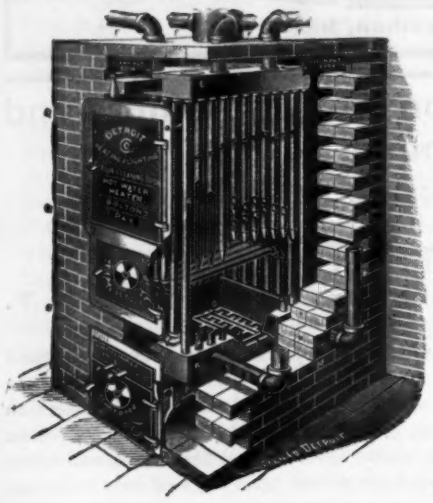
John Steptoe & Co., of the Western Machine Works, No. 214 West Second Street, Cincinnati, O., makers of shapers and machinists' tools, report a continuing good business. This improvement has been going on since October, 1889. Within a week they have received orders enough to keep them busy for two months to come. Thus far this year their business has been so good that they have not accumulated any stock on hand.

E. D. Shays & Co., 116 West Second Street, Cincinnati, O., wholesale dealers in heavy hardware and railroad machinists, miners', factory and foundry supplies, are agents for some of the best makers of leather belting and rubber goods, corundum wheels, iron and steel wire rope, shovels and other supplies. This firm of enterprising young men report having been doing a fair business thus far this season. Within the past few weeks it has been more quiet, not so many orders coming in.

Messrs. Radcliff, Rowe & Co., 35 and 37 Plum street, Cincinnati, O., proprietors of the Cincinnati Saw and Knife Works, are enjoying a great run of prosperity. The secret of this is the fact that Messrs. Radcliff and Rowe are both practical saw makers, having followed the business all their lives. Mr. Radcliff has charge of all the saws after they leave the tempering shop and the perfection of the product is largely due to his vigilance and intelligence. Mr. Rowe has charge of the tempering shop, and having made a special study of tempering for 30 years, is well fitted for his work. One of the best tests of the superiority of their product is their large trade in the South, where it requires a very tough temper to stand the work.

In our issue of the 14th, in the "Industrial Summary," we called our readers' attention to the valveless engine made by the Trump Engine Co., of Cincinnati, O. We gave an illustrated article of same in one of our issues some months ago, which attracted moch attention and brought to the company many inquiries concerning the new and economical engine. Within a few weeks this company have shipped one of their engines to England, and without doubt will soon receive good reports of the perfect and satisfactory working of same. The engine recently built by this company of 250 H. P., for the Cincinnati Electric Light & Gas Co., has been put in its place, is doing good work, and is giving the best of satisfaction. Since it has been in operation it has attracted much attention, and large numbers have been to see it. The company are receiving a goodly number of orders.

BOLTON



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No Bolted, Flanged or Packed Joints; therefore cannot Leak.
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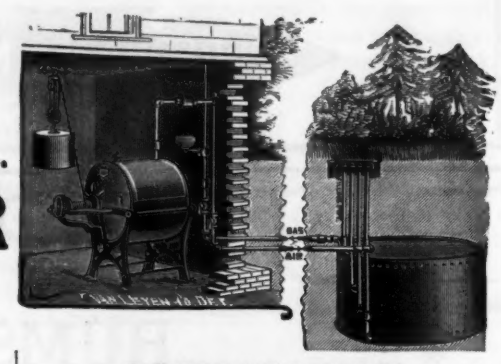

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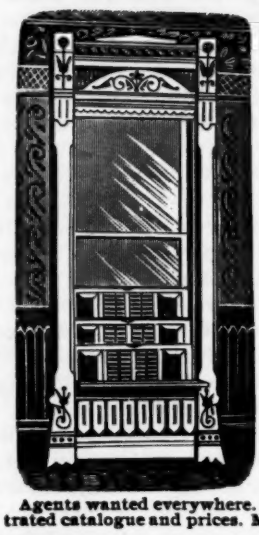

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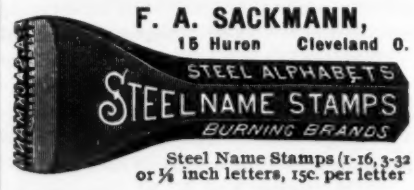

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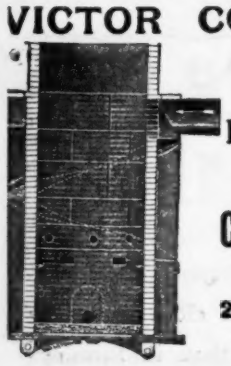

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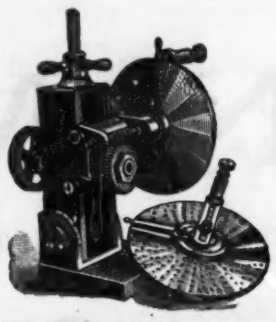

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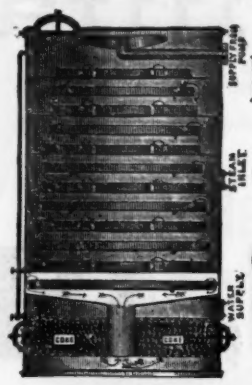

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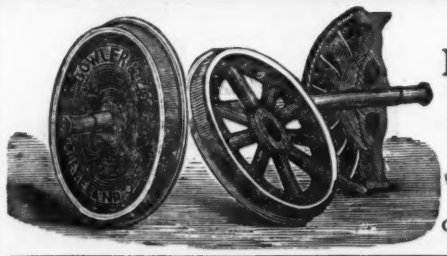

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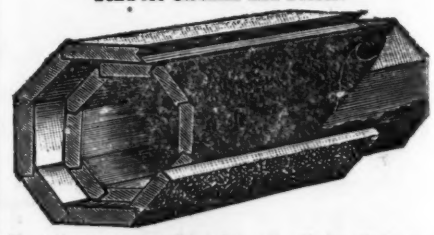

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Iron axles	22 00
Axle turnings	13 50
Wrought turning (free from cast)	12 00
Cast borings	9 00
Uncut wrought iron boilers	13 00
Steel boiler plates	17 00
Grate Bars	9 00
Pipes and flues (Clean)	13 00
Tank iron	13 00
Hoop and band iron	9 00
Sheet iron	10 00
Wrought drillings	11 00
Malleable iron	10 00
	GROSS TONS
Old iron T rails	24 00
Old steel rails	19 50
Old car wheels	18 50
Old copper	℔ 10
No. 1 H. red Brass	11
Heavy yellow brass	8½
Light yellow brass	6
Scrap Zinc	
Tea Lead	
Heavy Lead	3¼

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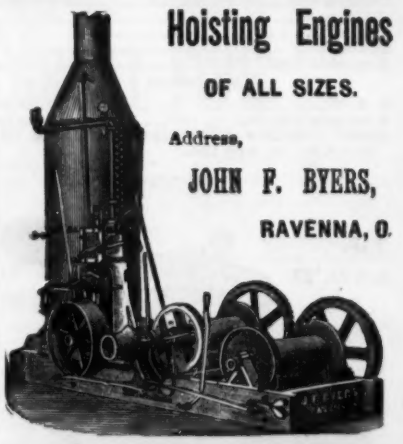

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MACHINERY SUPPLY MARKET.

Anvils.

American.....₩ lb 9@10
Wrights.....₩ lb 9¼

Bellows.

Blacksmiths' { Hill's.....dis 40 / Bullock's.....dis 50&10
Moulders'.....dis 40@40&10
Hand.....dis 40&10@50

Belting.

Boston Belting Co's standard.....dis 70
" " " extra.....dis 60&5
" " " best.....dis 55
Hoyt's Short Lap.....dis 45
Cleveland Rubber Co. extra standard..dis 60&10
Shults Raw Hide Leather Belting, single.....dis 40
Shults Raw Hide Leather Belting, double, and Light Double.....dis 40
Standard, oak tanned.....dis 50@60
Alexander Brothers' pure oak tanned....dis 45

Blowers and Exhausters.

B. F. Sturtevant's.....dis 20
Boston Blower Co.....dis 35
Buffalo.....dis 35

Borax.

.....₩ lb 9¼@10¼

Chalk.

White.....₩ gross 50
White Crayon.....₩ gross 12@12½ dis 10
Red.....dis 70
Blue.....dis 85

Chucks.

Cushman's 4 Jaw Independent.....dis 45
" Combination.....dis 40
" Geared Scroll.....dis 30
" 2 Jaw Brass Workers.....dis 30
" Drill.....dis 35
Wescott's Scroll Combination.....dis 33⅓
" Independent.....dis 40
" Little Giant Drill.....dis 30
Horton's Universal.....dis 40
" Independent.....dis 45
Whiton's Independent.....dis 45
National Combination.....dis 40
Sweetland " .....dis 40
Almond Drill.....dis 20
Morse " .....dis 15
Skinner's Combination Lathe.....dis 33⅓
" Independent Lathe.....dis 40
" Universal Lathe.....dis 40
" Drill.....dis 15

Cutters and Reamers.

Cleveland.....dis 10@15
Pratt & Whitney.....dis 10@15
Standard.....dis 10@15
Brown & Sharpe, Milling Cutters.....dis 15
" " Gear Cutters.....dis 15

Crowbars.

Cast Steel.....₩ lb 4
Iron, steel points.....₩ lb 3½

Drill and Drill Sockets.

Twist drills.....dis 50&10
Morse Taper and Straight shank to 1¼".....dis 50&10
Morse Taper and Straight shank Larger than 1¼".....dis 25
Drill Sockets.....dis 25
Standard Twist Drills.....dis 55@55&5
Cleveland " " .....dis 55@55&5

Emery.

	No. 4 to 46 gr.	No. 54 to 150. gr.	Flour, C. F. F.	FF.
Kegs, ₩ lb	4 c	5 c		2½c
½ kegs ₩ lb	4½c	5½c		2¾c
¼ kegs ₩ lb	4¾c	5¾c		3 c
10 lb cans, 10 in case	6 c	6¼c		5 c
10 lb cans, less than 10	10 c	10 c		7¼c

Emery Cloth and Paper.

Barder, Adamson & Co.....dis 45@50
H. H. Barton.....dis 50@5c&5

Emery Wheels.

Detroit.....dis 55@60
Norton's.....dis 55@60
Grant.....dis 55@60
Sterling.....dis 60
Celluloid.....dis 10&33⅓
Northampton.....dis 55
Crystal.....dis 65@70
Vitrified.....dis 60
Vulcanite.....dis 10&10
Industry File Works, hand cut.....dis 50

Files.

Nicholson.....dis 60&10@60&10&10
" X. F.....dis 25
Kearney & Foot.....dis 60&10@60&10&10
Black Diamond.....dis 60&10@60&10&10
Arcade.....dis 60&10@60&10&10
Disston's.....dis 65@70
Western.....dis 70
Stub's.....dis 25
Grobet's.....dis 30
Reynolds Bros.' Hand Cut.....dis 50

Hammers.

P. S. W.....dis 40
Atha new list, Jan. 15, 1887.....dis 50
Heavy hammers and sledges under 5 lbs. 18c over 5 lbs 14c, new list.

Jack Screws.

Illinois Bolt Co. list.....dis 70

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4½	4	3½	3⅛
Hexagon	15¾	11½	8¾	6	5⅜	5¼	5
Washers	9	8	7	5	4½	4⅛	4⅛

In lots less than 100 lbs, ₩ lb add ½c., 1lb boxes add 1c to list.

Nails (wire.)

List July 14, 1887.....dis 70 &10
Standard Penny Nails, ₩ keg card rate
{ Car lots.....$2.30 / { Less than car lots $2.40

Oilers.

Zinc and Tin.....dis 60
Brass and Copper.....dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz.....dis 70@10&10

Packing, Steam.

Boston Belting Co.....dis 60
American Packing Hemp.....₩ lb 10@11
Russia Packing " .....₩ lb 14
Italian Packing " .....₩ lb 13@14
Plumbago Piston.....₩ lb 40
Morrison's " .....₩ lb 50
Square Flax " .....₩ lb 50
Sheet Rubber.....₩ lb 12@24
Wrexelsior Rubber.....₩ lb 148

Picks.

Railroads, 5 to 6 lbs.....$12 dis 60
" 6 to 7 lbs.....$13 dis 60

Pulleys.

Iron Pulleys, Walker List.....dis 45
Medart Pulleys.....dis 55
Split Wood Pulleys.....dis 55

Rivets.

Iron, Thousand, list November 17, ...dis 50
Iron, Ordinary, Cooper's Block and Carriage list November 17.....dis 50
Copper.....dis 50@50&10

Rope.

Manilla, ¼ inch and over.....₩ lb 15¼
Sisal, ¼ inch and over.....₩ lb 13¾

Sand Paper.

B. A. & Co.....dis45@50
H. H. Barton's.....dis40@45
New England Flint.....dis 40@50
Barton's Garnet.....dis 20

Saws.

Disston's Circular.....dis 45
" Band.....dis 20
" Scroll.....Net
Hack Saw Stubs.....dis 20
" " Eureka.....dis 20
" " Star.....dis 20
Saw Swages Disston's.....dis 20
Atkins' Cicular Saws.....dis 50
" Mill, Mulay and Drag Saws..dis 40&10
" Wood Saws.....dis 40&10
" Silver Steel Diamond Cross-cut Saws.....dis 70c per ft
" Dexter Cross-cuts.....dis 50c "
" Diamond " .....dis 30c "
" Tuttle Tooth Cross-cuts..dis 25c "
" One-man Cross-cuts.....dis 32c "
No. 1 Handles.....dis 23c per pair
No. 6 " .....dis 16c "
Excelsior Saw Tools.....$6 per doz
Perfection " .....$15 "
Detroit Saw Works, Circular.....dis 50
" " " Band.....dis 25
" " " Mulay.....dis 45

Screws.

Wood Screws—List Jan 27, 1889.

Flat head iron.....dis 50
Round head iron.....dis 40
Flat head brass.....dis 45
Round head brass.....dis 35
Square Cap.....dis 65
Hexagon Cap.....dis 60
Set C. H. C. P.....dis 70
Machine, flat head, iron.....dis 65
Machine, round head, iron.....dis 60
Bench and hand—
Lag or coach.....dis 75@75&10
Coach, patent gimlet point.....dis 75

Shovels and Spades.

Ames' list November 1, 1885.....dis 20
Dennis.....dis 5-25
Hussey & Binns, railroad.....dis 8.00

Taps.

Cards, Hand and Nut to 2 in.....dis 50
Carpenters' " " " .....dis 50
Morse " " " .....dis 50
Pratt & Whitney " " new list dis 10
Machine Screw Taps.....dis 55
Pipe Taps to 2½ in.....dis 70
Stay Bolt Taps.....dis 25
Stove Bolt Taps.....dis 50
Pulley Taps.....dis 40

Twine.

	BC.	B.
No. 12, Flax Twine, ¼ and ½ lb Balls		21c@29c
No. 18 " " ¼ and ½ "		18c@28c
No. 36 " " ¼ and ½ "		16c@27c
2-Ply Hemp, ¼ & ½ lb Balls (Spring Twine)		11½c
3-Ply " 1lb Balls		12@12½c
3-Ply " 1½ lb Balls		11@11½c
Cotton Wrapping, 5 Balls to lb		15@16c

Vises.

Solid Box.....dis 60
Parker's.....dis 20@25
Prentiss.....dis 20
Stephen's.....dis 25@30
Barrett's.....dis 30
Miller's Falls.....dis 40
Merrill's.....dis 10@15
Howard.....dis 30

Wire.

New List, Jan. 18, 1884

Brass and copper.....dis 20@25
Bright and annealed, Nos. 0@18...dis 70&10@75
" " Nos. 19@26..dis 75@75& 5
" " Nos. 27@36..dis 75&10& 5
Coppered Nos. 0 to 18, market list..dis 70@70& 5
Galvanized Nos. 0 to 18 " ".....dis 65&5
Tinned market Nos. 0 to 18.....dis 67½
Cast steel.....dis 50
Tinned Broom Wire.....dis 70&5@70&10
Annealed Fence, Nos. 8 and 9.....dis 75
Annealed Grape, Nos. 10 to 14.....dis 75
Stub's Steel Wire regular.....$6.00@lb dis 30

Wrenches.

Coe's genuine, cash in ten days.....dis 50
Girard Standard.....dis 70&10
Agricultural.....dis 75&10
Mechanics'.....dis 55&10,& 3
Bemis & Call's Combination.....dis 35
Donohue's Engineers.....dis 20&10
Lamson & Sessions Engineers.....dis 60
Billings & Spencer's Drop Forged.....dis 10
William's " " .....dis 10
Alligator " " .....dis 40

Improved Screw Cutting FOOT AND POWER LATHES

Drill Presses, Shapers, Band, Circular and Scroll Saws. Machinists' Tools and Supplies. Lathes on trial. Catalogue mailed on application.

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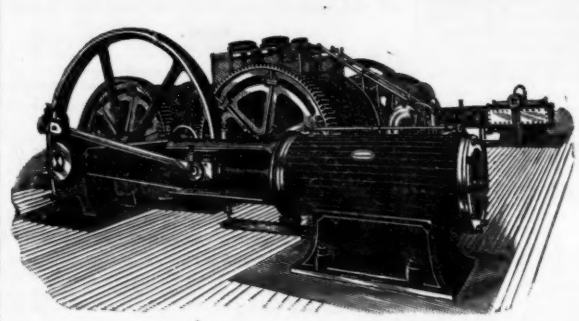

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IRON CASTINGS.
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HARDWARE MARKET.

Augers and Bits.

Common augers and bits.....dis 70
Snell's.....dis 60&5
Cook's Douglass Mfg. Co.....dis 55
Russell Jennings' augers and bits.....dis 25
Expansive Bits, Clark's small, $18; large, $26.....dis 35@35&5
Hollow Augers, Ives'.....dis 25&10
Hollow Augers, Bonney's Adjust. ℔ doz., $48.....dis 40&10
Hollow Augers, Stearns' Adjust. ℔ doz., $48.....dis 20&10
Gimlet bits, common.....per gross $3 25@4 00
Standard Bit Stock Drills.....dis 50&10&5
Ship Augers.....dis 15&10@15&10&5

Axes.

Makers' and Special Brands—
First quality.....℔ doz $8 00
Others.....℔ doz $7 00
Full polished.....℔ doz $9 00

Bolts.

Cast iron barrel bolts.....dis 70
Cast iron shutter bolts, etc.....dis 70
Cast iron chain bolts.....dis 65&10
Ives' patent door bolt.....dis 60
Wrought iron barrel bolts.....dis 70
Wrought iron square bolts.....dis 70
Wrought shutter bolts.....dis 60&10
Sargent's list
Carriage, common, new list.....dis 70&10&7½
Tire, common, new list.....dis 70
Carriage and tire, Philadelphia pattern.....dis 75&10
Stove bolts.....dis 60
Plow bolts.....dis 60&5
Machine.....dis 75&10@80
Ends.....dis 75&10&80

Buckets, Elevator.

.....dis 50&10

Butts.

Wrought brass.....dis 75&10
Cast brass, loose joint.....dis 33⅓
Cast Iron—
Fast joint, narrow.....dis 50&10&5@60
Fast joint, broad.....dis 50&10@60
Loose joint.....dis 70&5
Loose joint, jap.....dis 70&5
Loose joint, jap. with acorns.....dis 70&5
Loose pin, acorns.....dis 70&5
Loose pin, japanned acorns.....dis 70&5
Loose pin, acorns, jap. plated tips.....dis 70&5
Wrought steel—
Wrought, fast joint, narrow.....dis 70&5
Wrought, fast joint, broad.....dis 70&5
Wrought, loose joint, broad.....dis 70&5
Table Butts, back flaps, etc.....dis 70&5
Regular inside blind.....dis 70&5
Light inside blind.....dis 70&5
Loose pin.....dis 70&5
Light loose pin.....dis 70&5

Chains.

Revised List.

Trace, 6¼-10-2.....℔ pair 1.03
Trace, 6¼-10-3.....℔ pair .92 } .....50&10
Trace, 7-10-2.....℔ pair 1.11
German Halter Chain, list June, 1887...dis 50&10
German Coil, list of June, 1887.....dis 50&10@60
Galvanized Pump Chain.....℔ lb 5½@6
Jack Chain, Iron.....dis 75@75&5
Jack Chain, Brass.....dis 75

Chisels.

Socket Framing and Firmer.....dis 75
Socket Framing and Firmer, Buck Bros..dis 30
Socket Firmer and Framing, L. & I. J. White.....dis 30@30&5
Tanged Firmers.....dis 40&10

Cutlery.

Table.....net
Excelsior Pocket.....net

Fibre Ware—Standard.

	Nos. 1	5.	5X.
Pails, water, 12 qt	$4 00	$4 50	$.....
Dairy, 14 qt	4 50	5 00	.....
Fire 12 qt	5 00	.....	.....
Sugar	6 00	6 50	.....
Horse	.....	5 00	.....
Buggy	4 00	.....	.....
Chamber, Slop, Commode } 5 and 5X 14 qt.	6 50	7 50	8 50
Jars, slop, 5 and 5X 14 qt	8 00	9 00	10 00
Basins, wash—			
10½ inch	2 00	2 25	.....
12 inch	2 25	2 75	3 25
13½ inch	2 75	3 25	3 75
15 inch	3 25	3 75	4 25
Bowls, fruit	.....	2 50	.....
Servers, 12 in	.....	2 25	.....
Baskets, waste paper, 13 in	.....	6 00	.....
Spittons, "Daisy," pressed 8 inch	4 00	4 50	5 00
10 and 11½ inch	6 00	6 50	7 50

No. 1 plain; No. 5 decorated; No. 5X White decorated.

Gimlets.

Nail and Spike.....dis 50&10&5
Double cut, low list.....dis 25
"Bee".....℔ gross $12, dis 25@25&5

Hanger

Barn door, old patterns.....dis 50&10&10@70
Climax, (Anti-Friction).....dis 60
Scranton.....dis 40
Kidder's.....dis 50&10@60
Terry's Patent.....5 in., $12; 4 in., $10, dis 50&5
Paragon.....dis 50&10
Richard's.....dis 30@30&10

Horse Nails.

	No. 10	9	8	7	6	
Ausable, ℔ M.	23	24	25	26	28	dis 25&10
Putnam, ℔ M.	18	19	20	21	23	dis 15
Essex						dis 25&10

Horse Shoes.

Burden, at factory.....℔ keg $4 00
R. I. Horshoe Co., Perkins' Imp. at factory.....℔ keg $4 00
Mule Shoes, at factory.....℔ keg $5 00

Knobs.

Carriage, japanned.....℔ gross 80c dis 60&10
Base, rubber tip.....dis 70&10&5
Hematite door knobs, new list.....dis 40&10@50
Door mineral.....dis 65c@68c
Door Por. japanned.....dis 75c@78c
Door Por. nickle.....$2 00@2 25
Door Por. plated.....$2 00@2 25

Locks, Bolts, Etc.

P. & F. Corbear, Locks and Bronze Goods.
Door locks, knobs and latches.....dis 60
Escutcheons and keys.....dis 60
Padlocks and padlock keys.....dis 66⅔
Bell pulls, mineral, porcelain and jet.....dis 60
Bell pulls, genuine bronze.....dis 60&10
Lever bell pulls, genuine bronze.....dis 60&10
Butts', genuine bronze.....dis 60&10
Butts' bronze plated.....dis 60&10
Store door locks and latches.....dis 60&10
Store door handles.....dis 60&10
Shutter hinges&flaps, genuine bronze.dis 60&10
Shutter hinges, bronze plated.....dis 70
Flush bolts, genuine bronze.....dis 70
Shutter knobs, genuine bronze.....dis 50
Shutter bars, genuine bronze.....dis 60
Sash lifts, genuine bronze.....dis 60
Sash pulls and plates, genuine bronze.....dis 60
Push plates, genuine bronze.....dis 60
Drawer pull, genuine bronze.....dis 70
Letter box plates, genuine bronze....dis 60&10
Barn door locks.....dis 33⅓
Bishop's Buckeye Sash Locks.....℔ gross $4.80

Plumbs and Levels.

Standard list.....dis 70&10
Pocket levels.....dis 70&10
Davis' inclinometers.....dis 10&10

Pumps.

Cistern, best makers.....dis 50&10@60
Pitcher spout, best makers dis 60&10@60&10&10
Pitcher spout, cheaper goods.....dis 70@70&5

Pokes, Animal.

Bishop's I. X. L.....℔ doz $6 00
Bishop's O K.....℔ doz $5 25
Bishop's Pioneer.....℔ doz $3 75
Bishop's American.....℔ doz $2 75

Rakes.

Cast steel.....dis 70
Malleable.....dis 70@70&5

Razors.

J. R. Torrey Razor Co.....dis 20
Wostenholme & Butcher.....$10@4.....dis 10
Rifle razor.....dis $9 50 net

Rat Killers.

Schuyler's.....℔ gross $15 00

Scales.

Hatch, Counter, No. 171.....℔ doz $21 00
Hatch, Tea, No. 161.....℔ doz $6 75@7 00
Chatillon's Grocers.....dis 50
Family Turnbulls.....dis 30@30&10
Scale Beams, List of January 12, 1882.....dis 50&10@50&10&4

Screw Drivers.

Stanley R. & L. Co.'s Varnished Handles.....dis 65&10
Stanley R. & L. Co.'s Black Handles..dis 60&10
Sets interchangeables.....℔ doz $18 dis 25

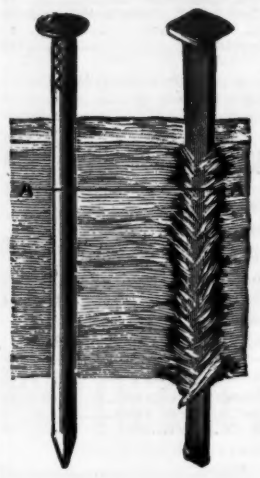
Squares.

Steel and iron, Nickel plated } dis 75&10@80
Disston's try square and T bevels.....dis 45&10
Winterbottom's try and miter.....dis 30&10

Tacks, Brads, Etc.

New List, Oct. 19, 1890.

American iron carpet tacks all kinds dis 70&10&10
Steel carpet tacks all kinds.....dis 70&10&10
Swedes iron carpet tacks, all kinds dis 70&10&10
Swedes iron tacks.....dis 70&10&10
Swedes iron Upholsterers' tacks..dis 70&10&10
Tinned Swedes iron tacks.....dis 70&10@10
Tinned Swedes iron Upholsterers' tacks.....dis 70&10&10
American iron cut tacks.....dis 67½&10&10
Copper tacks.....dis 50
Copper finishing and trunk nails.....dis 50&00
Cigar box nails.....dis 45&10
Finishing nails.....dis 65
Hungarian nails and miners' tacks.dis 62½&5
Gimp and lace tacks.....dis 70&5
" " " tinned.....dis 66&10
Trunk and clout nails.....dis 66⅔
Tinned trunk&clout nails.....dis 66&10&10
Basket nails.....dis 66&10&10
Chair nails.....dis 66&10&10
Common and patent brads.....dis 66&10&10



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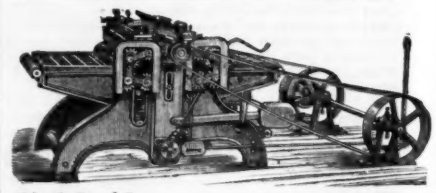

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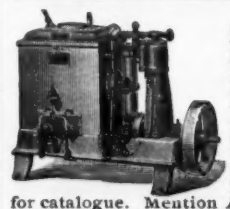

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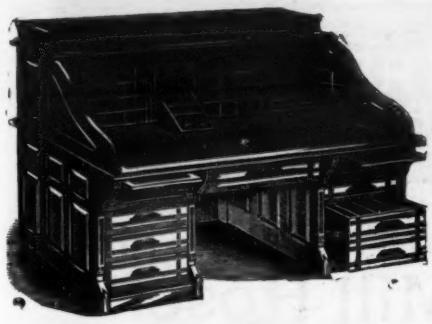

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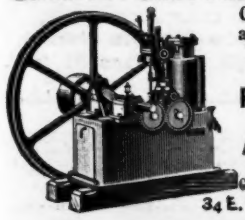

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Kent—6:50 a. m., 3:00 p. m., *5:45 p. m. 6:20 p. m.
Bedford—6:50 a. m., 11:10 a. m., 1:30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m. 10:35 p. m.
Newburgh—6:15 a. m., 6:50 a. m., 11:10 a. m., 1.30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m., 10:35 p. m.

Arrive from—

Zanesville and Coshocton—10:30 a. m.,6:30 p. m.
Canton, 10:30 a. m., 2:35 p. m., 6:30 p. m.
Kent—*8:10 a. m., 10:30 a. m., 2:35 p. m., 6:30 p.m.
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	1 15 p m	12 50 p m
	d11 10 p m	6 35 p m
Wheeling and Bellaire.	7 45 a m	12 50 p m
	1 15 p m	6 35 p m
	*11 10 p m	.....
Alliance Accom.	3 25 p m	10 10 a m
Ravenna Accom.....	5 00 p m	8 25 a m

d Daily. * Except Saturday. Other trains except Sunday.

From Cleveland Union Station.

Mt Vernon and Pan Handle Route

Cleveland & Pittsburgh R. R.

	Depart.	Arrive.
For Cuyahoga Falls, Akron, Orrville, Millersburg, Gambier, Mt. Vernon, Columbus, Xenia, Dayton, Cincinnati, Louisville, Indianapolis, St. Louis, and all points in the South and Southwest.	8 00 a m	d 7 00 am
	d 8 00 p m	5 40 p m
For Cuyahoga Falls, Akron, Orrville, Millersburg, Gambier, Mt. Vernon and Columbus.	1 15 p m	12 50 p m
For Cuyahoga Falls, Akron, Orrville, Chicago, and all points in the West and Northwest.	8 00 a m	5 40 p m
	3 25 p m	10 10 a m

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	Depart.
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No. 72, New York & Pitts. Express....	* 8 10 a m
No. 70, Pittsburgh Accom.....	*11 25 a m
No. 64, New York & Pitts. Limited...	* 2 50 p m
No. 66, Mantua Accommo.....	* 4 20 p m
No. 74, Youngst'n Ex.....	† 6 00 p m
No. 68, New York & Pitts. Ex.....	*11 00 p m
	Arrive.
No. 61, N. Y. & Pittsburgh Express...	† 5 15 a m
No. 71, Youngstown Accom.....	* 7 15 a m
No. 65, New York & Pitts. Lim.....	* 9 55 a m
No. 67, Pittsburgh Accom.....	*12 45 p m
No. 73, Leavitssburgh Local.....	* 2 10 p m
No. 63, New York & Pitts. Ex.....	* 6 50 p m
No, 75, Mantua Accom.....	* 7 20 p m
No. 69, Youngstown Express.....	† 9 10 p m

*Daily. †Daily, except Sunday.

Baggage checked through to all points East.

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M. L. FOUTS, City Pass. and Ticket Agt., 141 Superior st., Weddell House, Cleveland, O.

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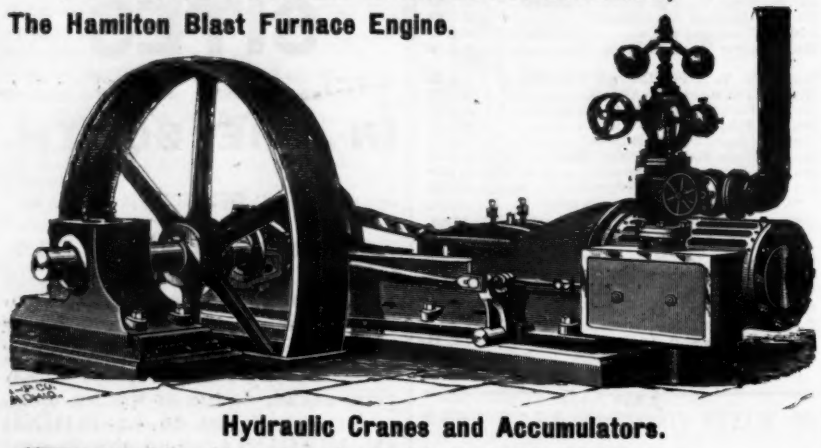

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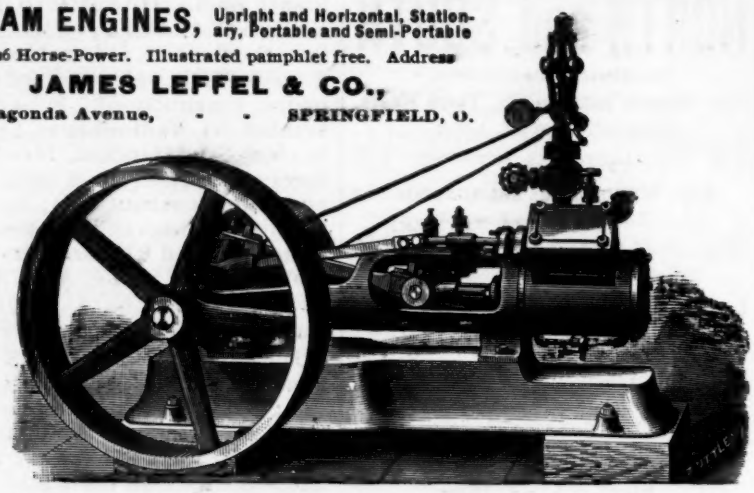

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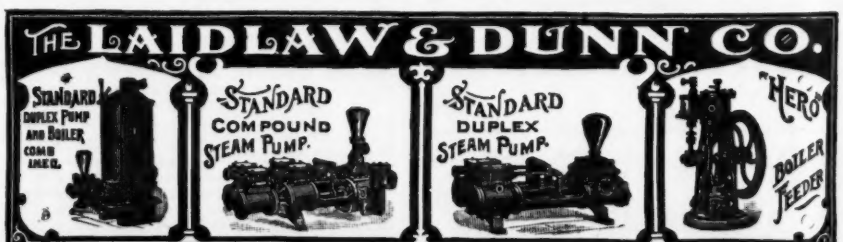

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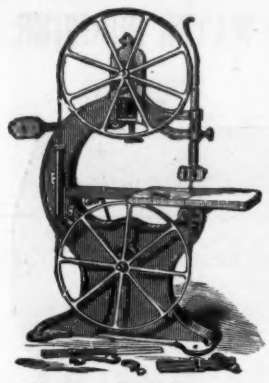

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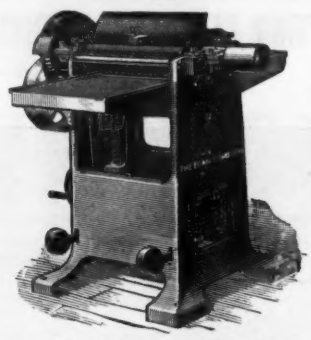

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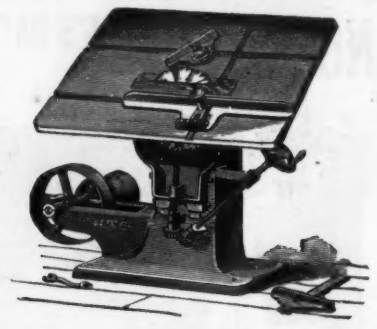

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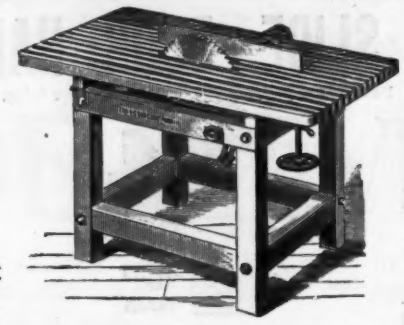

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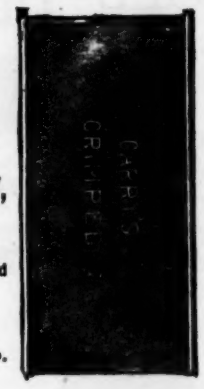

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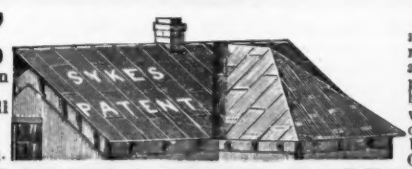

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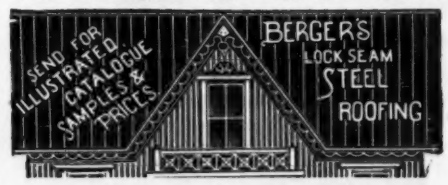

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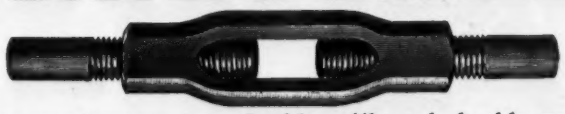

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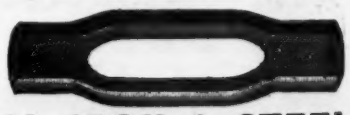

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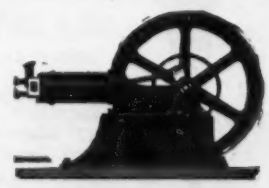

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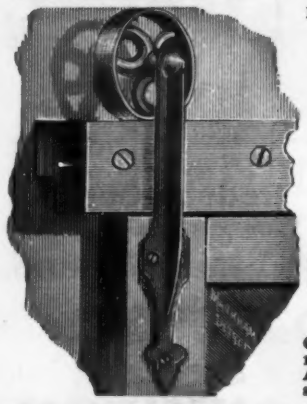

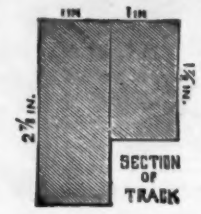

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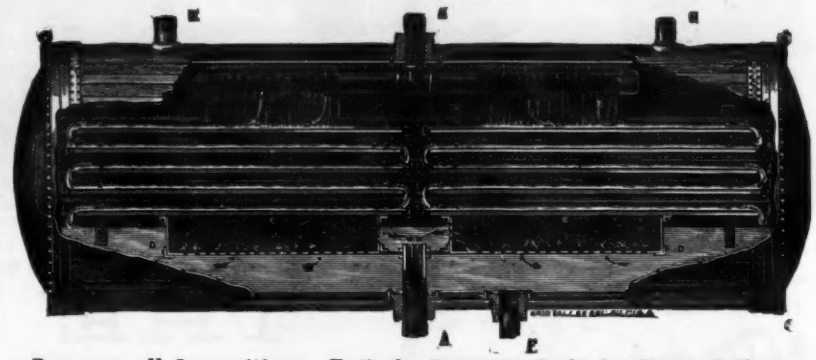

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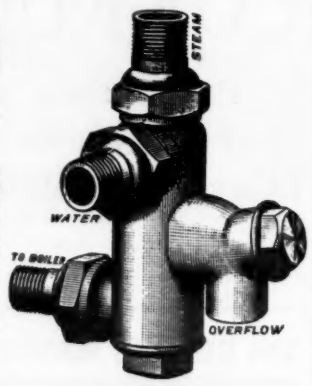

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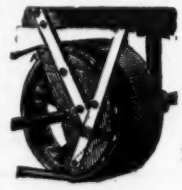

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